Schwarze Industries, Inc.

A8 TWISTER

Operations & Service Manual

A8-15 revised 06/15

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Schwarze Industries, Inc.

A8
TWISTER

Operations & Service Manual

Schwarze Industries, 1055 Jordan Road, Huntsville, AL 35811 USA

Foreword

Dear customer,

We are pleased to have you as a Schwarze customer. Your new sweeper has been carefully designed with care to give maximum service with minimum down time.

This manual is provided to give you the necessary operating and maintenance instructions for keeping your sweeper in top operating condition. Careful use and timely service saves extensive repairs and costly downtime losses. Make sure to read this manual thoroughly and understand what each control is for and how to use it.

Safety is of primary importance to the owner/operator and to the manufacturer. Observe all safety precautions decals on the machine and noted throughout the manual for safe operation of implement. If any assistance or additional information is needed, contact your authorized Schwarze dealer.

In addition to many Authorized Dealers located throughout the country. Schwarze Industries also maintains a fully stocked factory service center in Huntsville, Alabama. In the event you need parts or service, call your nearest Authorized Dealer. Their name and number can be found on the Sweeper Information Sheet, located in the front of this manual. In the unlikely event that your local dealer is unable to provide the assistance you require, call us at our home office in Huntsville, Alabama. We have a state-of-the-art fabrication and production facility and a complete service and refurbishing center with an inventory of over $500,000 in spare parts. In most cases, same day shipping and overnight delivery is available.

Our goal at Schwarze Industries is always, 100% customer satisfaction. We're confident you'll find your new sweeper to be the best built on the market, and it's backed by a company with a service commitment that's second to none.

To assure prompt delivery and processing of your parts order, please have the following information ready before calling:

- Type and serial numbers for the chassis, power module engine and the sweeping unit. (This information is also located on the Sweeper Information Sheet in the front of this manual).
- The part number(s), description(s) and the quantity desired. (Please indicate any relevant particulars such as whether the part is for the right or left, front or rear)
- Shipping instructions: Tell us how you want you order shipped (e.g., next day air, second day air, truck, freight, etc.). When left unspecified, orders are shipped UPS. Truck freight is used when weight restrictions apply.

Every effort is made to ship all in-stock parts on the same day the order is placed when received before 12:00 noon Central Time. Orders received after noon are shipped on the following business day.

For customer convenience, orders may be faxed to the Schwarze factory 24 hours per day. Our parts department's fax number is 1-256-851-1199

Schwarze Warranty Information

Now that you are the proud owner of a brand new Schwarze sweeper, don't forget to fill out and sent the warranty forms for the truck chassis, sweeper, and auxiliary engine to the appropriate component manufacturer. Failure to do so may result in costly delay or denial should a warranty claim be made.

Warranty claims are handled by our warranty department, Before any warranted parts may be returned for warranty credit, however, authorization by a Schwarze representative must first be obtained. Also, once the authorization has been granted, the defective part MUST be returned to us. This policy allows for efficient parts shipping and account crediting.

For your convenience, we accept MasterCard and Visa. Once received, shipments should be examined immediately. Any shortage or damage should be noted on the freight bill or express receipt BEFORE the parts are accepted from the carrier. Immediate notification to us of such shortage or damage is also required.

If you still have questions with the service or operation of your sweeper after consulting the maintenance and troubleshooting sections of this manual, call us toll-free and we will provide you with additional instruction.

At Schwarze Industries we are truly committed to your complete satisfaction with our products and services. If you ever need help, don't hesitate to call. Many ideas for improvements to previous models have come from users in the field. If you have an idea or suggestion on how we might make our product even better.

Call our toll-free number: 1-800-879-7933. We are only a toll-free phone cal away.

We Want to Hear From You!

As reader of this manual and operator of your Schwarze sweeper, you are our most important critic and commenter. We value your opinion and want to know what we're doing right, what we could do better, what additional information you'd like to see in our manuals, and any other worlds of wisdom you're willing to pass out way.

Schwarze Industries welcomes your comments. You can email or write us directly to let us know what you did or didn't like about this manual - as well as what we can do to make out manuals better.

When you write, please be sure to include this manuals title as well as your name, email address, and phone number. We will carefully review your comments and share them with the departments and teams that worked on this manual.

Email: communications@schwarze.com

Mail: Publishing Department
Schwarze Industries
1055 Jordan Road
Huntsville, AL 35811 USA

For more information about our Schwarze products, visit our website at www.schwarze.com

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Section 1 - Technical Data

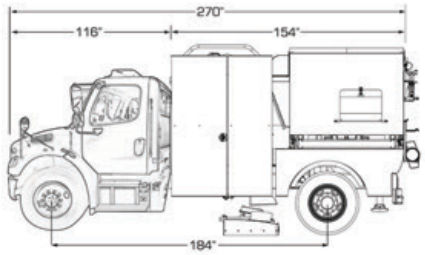
1

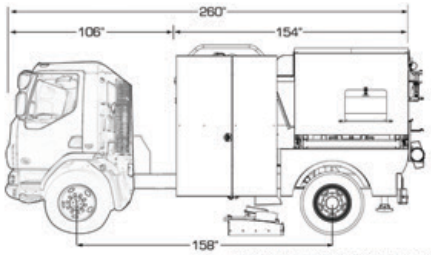
In this Section

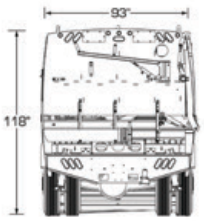
Technical Drawings

Sweeper Specifications

Section 1 - Technical Data







*TYPICAL MEASUREMENTS SHOWN , EXACT DIMENSIONS DEPENDING ON OPTIONS AND TRUCK MANUFACTURER

SWEEPING PATH

Pickup head only	90 in (2286 mm)
Pickup head and one side broom	117 in (2972 mm)
Pickup head and two side brooms	144 in (3658 mm)

CHASSIS

Mounts on various chassis to meet requirements

SWEEPER BODY

Construction	Welded 10-gauge stainless steel plate
Safety props	Lift spacers

INSTRUMENTATION

Auxiliary engine	Flat panel display; tachometer; hourmeter; voltmeter; temperature gauge; oil pressure gauge; warning icons

AUXILIARY ENGINE

Model/type	4045T in-line 4 cylinder
Aspiration	Tier 4 Final turbo-charged diesel
Manufacturer	John Deere
Displacement	275 cu in (4.5 L)
Brake horsepower	115 hp (86 kw) @ 2400 rpm
Torque	317ft lb (430 Nm) @1500 rpm
Air cleaner	Centrifugal precleaner; dry type with safety element and restriction indicator
Oil filter	Full-flow/spin-on
Stroke	5 in (127 mm)
Bore	4.20 in (106 mm)
Compression ratio	19 to 1
Safety shutdown	Three-point automatic
Throttle control	Electronic

ELECTRICAL SYSTEM

Voltage	12 V
Sweeper engine alternator	65 amp

DUST SUPPRESSION SYSTEM

Type	High pressure/low volume
Capacity	250 gal (946 L)
Tank construction	Polyethylene filter; 200 mesh; cleanable
Fill diameter	2.5 in (63.5 mm)
Fill hose	25 ft (7620 mm)
Controls	Electric; in-cab

Dust suppression system cont'd

Nozzles	2 on each broom; 5 around suction head; 2 inside suction nozzle; 2 on front axle; 4 inside hopper
Water level gauge	In-cab

FAN SYSTEM

Type	Closed-face radial
Drive	Direct via 5 groove; banded power belt
Construction	Hardox steel
Balance	1.5 g on 2 sides
Diameter	32.75 in (832 mm)
Housing lining	Bolt-in corded rubber
Mounting	2 regreaseable sealed bearings
Vacuum enhancer	For heavy/light material; in-cab indicator

PICKUP HEAD:

Type	Dual chambered full-width blast orifice
Operating direction	Forward and reverse
Suspension	Adjustable spring balanced
Length	90 in (2286 mm)
Pressure hose diameter	14 in (355.6 mm)
Suction hose diameter	14 in (355.6 mm)
Hose construction	3/8 in (9.5 mm) wire-reinforced molded rubber
Head area	3240 sq in (20 903 sq cm)
Controls	Hydraulic raise and lower
Skids	Double wide tungsten carbide
Construction	Abrasion-resistant steel inlet and outlet transitions.

PAINT

One coat of sealer/primer and two coats of Dupont imron elite polyurethane in standard white color

SIDE BROOMS

Type	Vertical steel digger
Location	Right; left; forward of pickup head
Diameter	44 in (1118 mm)
Drive	Hydraulic
Suspension	Torque-sensing spring
Wear adjustment	Automatic

Side brooms cont'd

Pressure	Manual
Speed	Variable; non-reversing
Segments	5 each side; disposable
Tilt angle adjustment	Manual with optional in-cab controls

DEBRIS HOPPER

Volumetric capacity	6 cu yd (4.59 cu m)
Dump angle	50 degrees
Floor angle	0 degrees
Lifting	Twin hydraulic cylinders scissor-lift
Hopper dump door	Full height; full width open/close/lock hydraulically
Inspection doors	1 on left side of hopper
Dump height	24 in to 144 in high
Construction	Stainless steel floor; sides and roof

HYDRAULIC SYSTEM

Type	Dual output 2 section
Pump capacity	8 gpm @ 1800 rpm (30 lpm) per section for 16 gpm total
Drive	Direct gear
Maximum pressure	2750 psi (190 bar)
Reservoir	25 gal (94 L)
Filter	10 micron; spin on
Protection	Pressure relief valve
Controls	Electro-hydraulic

AUXILIARY HYDRAULIC SYSTEM

Type	Gear type; driven by electric motor
Function	Lower hopper; open/close hopper door; raise brooms and pickup head

Note: Design and specifications subject to change without notice.

Section 2 - Safety

2

In this Section

General Safety Instructions and Practices

Personal Protection Equipment - PPE

Operator Safety and Hazards

Maintenance Safety and Hazards

Federal Laws & Regulations

Safety Decals Locations

2.1 General Safety Instructions and Practices

A careful operator is the best operator. Safety is of primary importance to the manufacturer and should be to the owner/operator. Most accidents can be avoided by being aware of your equipment, your surroundings, and observing certain precautions. The first section of this manual includes a list of Safety Messages that, if followed, will help protect the operator and bystanders from injury or death. Read and understand these Safety Messages before assembling, operating or servicing this Implement. This equipment should only be operated by those persons who have read the manual, who are responsible and trained, and who know how to do so responsibly.

The Safety Alert Symbol combined with a Signal Word, as seen below, is used throughout this manual and on decals which are attached to the equipment. The Safety Alert Symbol means: "ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!" The Symbol and Signal Word are intended to warn the owner/operator of impending hazards and the degree of possible injury faced when operating this equipment.

Practice all usual and customary safe working precautions and above all---remember safety is up to YOU. Only YOU can prevent serious injury or death from unsafe practices.

DANGER Indicates an imminently hazardous situation that, if not avoided, WILL result in DEATH OR VERY SERIOUS INJURY.

WARNING Indicates an imminently hazardous situation that, if not avoided, COULD result in DEATH OR SERIOUS INJURY.

CAUTION Indicates an imminently hazardous situation that, if not avoided, MAY result in MINOR INJURY.

IMPORTANT Identifies special instructions or procedures that, if not strictly observed, could result in damage to, or destruction of the machine, attachments or the environment.

NOTE Identifies points of particular interest for more efficient and convenient operation or repair.

READ, UNDERSTAND, and FOLLOW the following Safety Messages. Serious injury or death may occur unless care is taken to follow the warnings and instructions stated in this Manual and in the Safety Messages on the implement. Always follow the instruction in this manual and use good common sense to avoid hazards.

Pictographs are used throughout this manual to help bring your visual attention to safety issues.

SAFETY HAZARD	SAFETY AVOIDANCE	SAFETY PREVENTION
Pictograph surrounded by a triangle indicates a Safety Hazard that must be avoided. *Example:* Equipment contacting overhead electrical lines	Pictograph by itself or inside a box indicates an avoidance procedure that should be followed to prevent injuries. *Example:* Always shut off engine and remove key before working on equipment.	A circle with a slash through it indicates an action that is prohibited. *Example:* No Smoking

NOTE If you want a translation of this safety section in one of the following Languages, please contact: Translations at 1502 E. Walnut Street Seguin, TX 78155; Fax: (830) 372-9529; Safety Section Translations are available in Spanish, Portuguese, French, German, Russian. *SW-GS-01*

2.2 Personal Protection Equipment - PPE

Always wear all protective clothing and personal safety devices issued to you or called for by job conditions. This should always include:

- Hard hat when working around a raised hopper.
- Safety shoes
- Safety glasses, goggles or face shield
- Gloves
- Hearing protection
- Reflective clothing
- Close Fitted Clothing
- Respirator - Depending on conditions and material being swept or cleaned.

Specialized protective equipment may be required if dangerous or hazardous material is being swept by or cleaned from the sweeper. **Do not enter debris hopper** if hazardous materials are suspected inside debris hopper. Take unit to a certified tank cleaning facility.

⚠WARNING Never wear loose clothing or jewelry that can catch on controls or other parts of the machine. Loose clothing can be drawn into the suction hose or pickup head. Never wear a wristwatch or finger rings when working on or around equipment.

PN SW-PPE-01

2.3 Operator Safety

Read and Understand Operator's Manual	DO NOT USE DRUGS or ALCOHOL before or while operating equipment	Always shut off engine and remove key before working on equipment	Always wear your seatbelt

⚠WARNING To avoid serious injury or death do the following:

- Read, understand and follow operator's manual instructions, warnings and safety messages.
- Do not allow untrained or unauthorized persons to operate equipment.
- Do not allow untrained coworkers to operate or assist in operating equipment.
- Do not allow bystanders near equipment or work area.
- Do not allow anyone to operate equipment under the influence of drug or alcohol.
- Do not use drugs or alcohol before or while operating equipment.
- Consult medical professional for medication impairment side effects
- Stay alert, prolonged operation can cause fatigue, STOP and Rest.
- Wear appropriate PPE when handling chemicals. Refer to chemical MSDS sheets. Wear breathing respirator and protective suit when operating with hazardous or unknown substances
- Do not wear loose clothing or jewelry to avoid injury from entanglement in rotating parts.
- Always shut off engine, remove the key and set the parking brake before working on the truck or equipment
- Keep away from ROTATING ELEMENTS like side brooms, main broom and fan system.
- Do not operate sweeper if excessive vibration or noise exists.
- Never operate the sweeper if it becomes entangled with wire, rope, cable or chain. These items can cause mechanical damage or injure the operator or passerby.
- Keep away from suction elements such as the pickup head and suction hoses to prevent from being drawn into pickup head, this could cause serious injury or death.

Ground Speed When Sweeping

- Normal speed range is 1 and 5 mph for curb line and 0 - 15 mph in open lot.
- DO NOT exceed rated operating speed for truck and Auxiliary.
- Never sweep debris that is too large for the sweeper to pick up.
- Use right side steering for sweeping, and never while exceeding 15 mph.sweeper must be driven from left side unless sweeper is only equipped with right side steering and controls.
- REDUCE spreading SPEED when near steep slopes, ditches, drop-offs, overhead obstructions, and power lines.
- Stop sweeping if anyone comes within 25 feet of sweeper.
- Side brooms are capable of propelling objects up to 25 feet

PN SW-OP-01

Operator Safety Continued

Use adequate lighting for proper vision	Do not touch hot surface. Keep hands and limbs away from hot surfaces	Tanks can be under pressure. Relieve pressure before opening	Use three-point contact when climbing on equipment

Visibility Conditions When Operating

- Operate in daylight or with lights that gives at least 50 yards clear visibility.
- Be able to see and identify passersby, steep slopes, ditches, drop-offs, overhead obstructions, power lines, debris and foreign objects.
- Use extreme care when backing up, vision may be limited, severe damage or injury can occur.
- Do not run engines in enclosed building without adequate exhaust ventilation.

Mounting and Dismounting Truck or Equipment

- Only mount or dismount when truck and moving parts are stopped.
- Always use three point contact when climbing on or dismounting.
- Walkways, steps, and handrails should be checked before use to ensure a proper non-slip surface. Replace or repair damaged component immediately.
- Always engage parking brake when exiting the truck.

Hot Surface

- Stay clear of hot surfaces such as mufflers, hydraulic pumps, valves and tanks.
- Relieve pressure from tank, reservoirs, valve and hoses before servicing or opening.

Safety Signs

- Replace missing, damaged or unreadable safety signs immediately.

Equipment Guards

- Never operate equipment if machine guards are damaged or missing.
- Replace missing or damaged guards immediately.

Riding Passengers

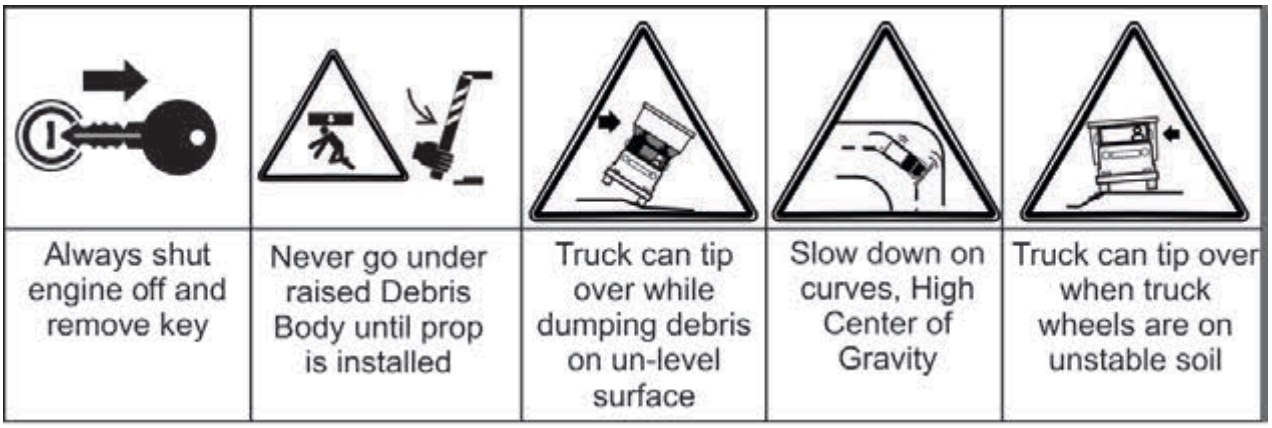
- Never allow passengers whose presence distracts from safe operation or transporting implement.
- If passengers presence is needed, passenger must be seated securely and belted in passenger seat.
- DO NOT allow passenger in any other location of implement during operation or transport.

Communication

- Verbal communication can be difficult and dangerous near implement.
- Operation instructions and directions should be made prior to starting implement
- If communication is necessary completely shutdown and exit implement.
- Never allow anyone to approach implement during operation or transport.

PN SW-GHP-01

2.4 Crushing Hazards and Prevention Safety



Always shut engine off and remove key	Never go under raised Debris Body until prop is installed	Truck can tip over while dumping debris on un-level surface	Slow down on curves, High Center of Gravity	Truck can tip over when truck wheels are on unstable soil

DANGER To avoid serious injury or death from falling off truck, equipment run over, rollover and crushing by falling implement.

Crushing By Falling From Equipment

- Always buckle up seat belt when operating truck and equipment.
- Only operate truck and equipment while seated in truck seat.
- Stop truck engine, place transmission into park, engage parking brake and remove key.

Debris Hopper Prop Support

WARNING Never go under raised debris hopper until prop is installed. Failure to do so could result in personal injury or death.

- Raise debris hopper sufficiently to allow hopper prop support to be placed into position.
- Remove hopper support, hold down and swing hopper prop support into support position.
- Slowly lower hopper until hopper contacts hopper prop support.
- To remove hopper prop support, reverse above procedure.

Truck Tip Over

WARNING Always wear seat belt while seated in truck to prevent injury.

- Slow down on curves to prevent truck from tipping over.
- Always ensure unit is on firm and level ground before operating the dump system. When dumping, raise the hopper in steps, allowing the material to dump out in a steady flow.
- Do not allow people and/or vehicles beside debris hopper while dumping.
- Never drive truck with raised debris hopper.
- Keep truck away from drop-offs and soft soil shoulder where truck could tip over.

To Avoid Children Falling Off Or Being Crushed By Equipment

- Never allow children to play on or around truck or equipment.

PN SW-CHP-02

2.5 Fan Blade And Pickup Head Contact Hazard

⚠ DANGER Keep away from rotating blades, belts and pulleys to avoid serious injury or death from blade contact:

- STAY AWAY and KEEP HANDS, FEET and BODY AWAY from rotating blades and parts until all moving elements have stopped.
- DO NOT put hands or feet under sweeper shielding.
- STOP rotating FAN BLADE, disengage power and wait for blade to stop rotating before adjusting sweeper shields.
- STOP, LOOK and LISTEN before approaching the sweeper to make sure all rotating motion has stopped.

PN SW-BC-01

2.6 Thrown Object Hazards

TRASH
BASURA
Sweeper Thrown Objects Hazard
Inspect area remove or avoid large objects.
Do Not let Sweeper contact solid objects

⚠ DANGER Sweeper can throw objects 25 feet or more.

To Avoid Serious Injury To Operator Or Passerbys From Thrown Objects

- KEEP bystanders 25 feet away.
- DO NOT operate of if main broom cover is open or missing. Broom can throw objects and result in serious injury or death.
- DO NOT operate if fan exhaust hose is removed. Fan can throw objects resulting in serious injury or death.

Stop Sweeper If Passersbys Are Within 25 Feet Unless

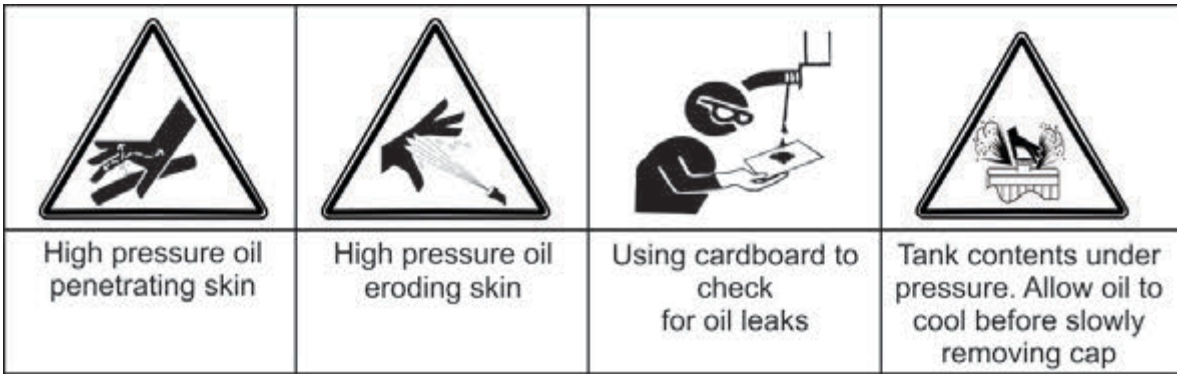
- All THROWN OBJECT SHIELDING including, Steel Guards, and Bands, are in place and in good condition while operating.

Sweeper Thrown Object Shielding:

- KEEP all thrown object shielding including Steel Guards, Bands, and Side Skirts in place and in good condition when operating.
- DO NOT OPERATE with any thrown object shielding missing, damaged or removed.

PN SW-TO-01

2.7 High Pressure Fluid Leak Hazards



High pressure oil penetrating skin	High pressure oil eroding skin	Using cardboard to check for oil leaks	Tank contents under pressure. Allow oil to cool before slowly removing cap

⚠ DANGER To Avoid Serious Injury Or Death From High Pressure Hydraulic Oil Leaks Penetrating Skin:

- DO NOT OPERATE equipment with oil or fuel leaks.
- KEEP all hydraulic hoses, lines and connections in GOOD CONDITION and TIGHT before applying system pressure.
- RELIEVE HYDRAULIC PRESSURE before disconnecting lines or working on the system.
- REMOVE and replace hose if you suspect it leaks. Have a qualified service facility test it.

High Pressure Fluid Leaks Can Be Invisible.

When Checking For Hydraulic Leaks And Working Around Hydraulic Systems

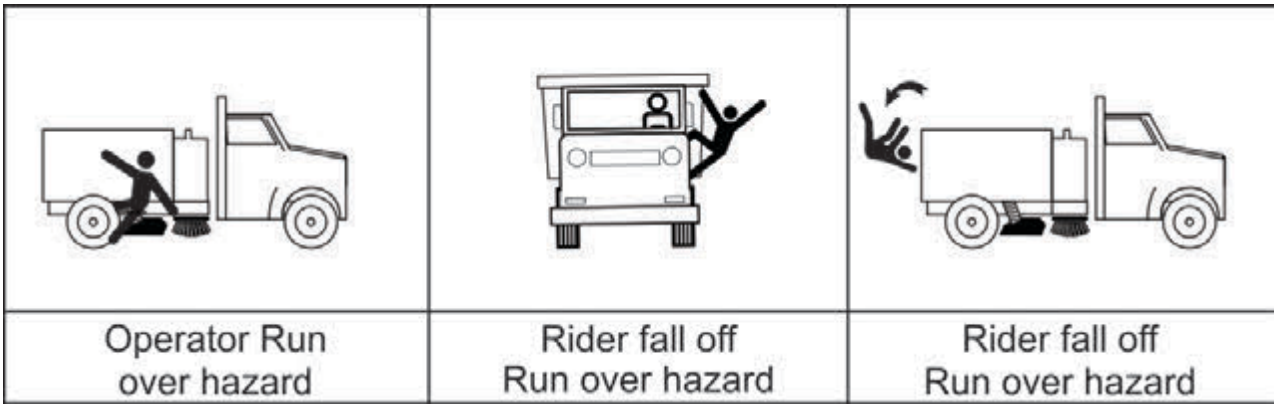
- ALWAYS WEAR safety glasses and impenetrable gloves.
- USE paper or cardboard to search for leaks.
- DO NOT USE hands or body parts to search for leak.
- KEEP hands and body AWAY from pin holes and nozzles ejecting hydraulic fluid.
- Hydraulic fluid may cause gangrene if not surgically removed immediately by a doctor familiar with this form of injury.

Use Caution When Removing Hydraulic Tank Cap.

- Tank contents maybe under pressure.
- Allow oil to cool before removing cap.
- Relieve oil pressure before removing cap slowly.
- Stay away from hot oil that may spray from tank or hoses

PN SW-HPF-01

2.8 Run Over Hazards



DANGER To avoid serious injury or death from falling off truck or equipment run over:

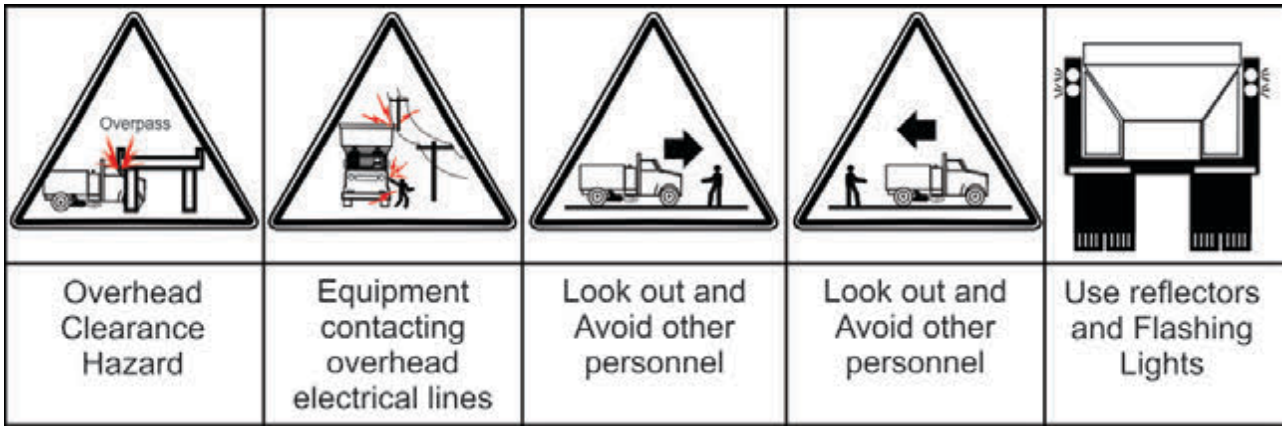
- ONLY start truck while seated in truck seat.
- ALWAYS BUCKLE UP seat belt when operating truck and equipment.
- ONLY OPERATE truck and equipment while seated in truck seat.
- NEVER ALLOW RIDERS on truck or implement.

When Mounting And Dismounting Truck

- ONLY mount or dismount when truck and moving parts are stopped.
- STOP ENGINE, engage parking brake, lower implement, allow all moving parts to stop and remove key before leaving truck cab.

PN SW-RO-01

2.9 Transport Safety and Hazards Warnings


Overpass
Overhead Clearance Hazard
Equipment contacting overhead electrical lines
Look out and Avoid other personnel
Look out and Avoid other personnel
Use reflectors and Flashing Lights

⚠WARNING To avoid serious injury and death when operating or transporting equipment:

- REDUCE SPEED on inclines, on turns and in poor towing conditions.
- DO NOT TOW with trucks or other vehicles.
- FOLLOW all local traffic regulations.

Before Transporting Or Towing Implement

Perform a truck inspection:

- CHECK steering and braking for proper operation and in good condition.
- CHECK reflectors and warning lights for proper operation and visibility behind unit.
- ROUTINELY inspect the equipment's headlights, brake lights, backup lights, and turn signal lights for operational condition.
- Always turn on all safety lights and flashers when you operate the implement.
- CHECK that your driving vision is not impaired by cab while seated in truck seat.
- ADJUST your operating position, mirrors, and implement transport for clear vision for traveling and traffic conditions.

Determine Stopping Characteristics Of truck And Implement For Transporting Or Operating

Perform a braking tests:

- Stopping distance with loaded debris hopper will be greater than empty truck.
- Reduce travel speed on wet or icy roads; stopping distances increase.

Determine Maximum Turing Speed Before Operating On Roads Or Uneven Ground:

- TEST equipment in slowly increasing speed in turns to determine it can be operated at higher speeds.
- USE REDUCED turning speeds in sharp turns to avoid equipment turning over.

When Operating Or Transporting Equipment

- Do Not Move truck unless debris hopper is fully lowered in the horizontal storage position.
- Always WEAR SEAT BELT when driving truck.
- FOLLOW all local traffic regulations.
- USE low speeds to avoid overturn tip over when debris hopper is filled.
- USE low speeds and gradual steering on curves, hills, rough or uneven surfaces and on wet roads.
- TURN ON truck FLASHING WARNING LIGHTS when driving slower than traffic.
- Only transport the truck at the speeds determined as safe and which allow for proper control of the machine while driving and stopping during an emergency.
- DO NOT leave piled material on roadway, material can be a hazard to other motorist.

To Avoid Serious Injury Or Death From Electrical Contact When Working Around Electrical Power Lines And Utility Lines

- INSPECT area for overhead power lines, obstructions, cables and Utility lines, Municipal, or other type structure.
- KEEP sweeper debris hopper 10 feet or greater distance from all power lines and overhead obstructions.
- DO NOT allow debris hopper to contact with any Utility, Municipal, or type of structures and obstructions.

THSP-01

2.10 Debris Hopper Dumping Safety and Hazards Warnings

Never go under raised Debris Body	Equipment contacting overhead electrical lines	Hand can be crushed by Debris Body	Truck can tip over when truck wheels are on unstable soil

⚠WARNING To avoid serious injury and death when dumping the debris hopper.

- EVER leave hopper raised or partly raised while vehicle is unattended or while performing maintenance or service under hopper unless hopper is propped to prevent accidental lowering. [Always disengage PTO when hoist is not in use or when moving vehicle.] The debris hopper MUST BE empty for service work.
- NEVER attempt to raise hopper when vehicle is on unlevel ground.
- NEVER GO UNDER A RAISED LOADED debris hopper.
- NEVER GO UNDER A RAISED HOPPER WITHOUT SECURELY PROPPING IT. HOPPER MUST BE EMPTY.
- Immediately report any damage or malfunction of the unit or components to your employer.
- NEVER ride, or let any other person ride on ANY part of the vehicle other than in the cab.
- Be certain that all individuals and obstructions are clear of the hoist and hopper before operating the controls and be ready to stop operation at any time that a hazardous condition might occur.

⚠WARNING Use extreme caution when dumping contents from the debris hopper. Ensure all personnel are at least 20 feet away from truck. Select a dump site on level ground and clear of overhead obstructions that could be hit when raising the debris hopper. Serious injury or death to the operator, bystanders could occur if precautions are not taken when dumping the contents of the debris hopper

- When positioning the truck at the dump station, choose an accessible location on level ground. Raising the debris hopper on unleveled ground increases the possibility of tipping.
- Make sure the area is clear of ground and overhead obstructions.
- Never raise the debris hopper unless you can clearly see all overhead structures. Make sure you stay clear of all utility lines.
- Do not dump the debris hopper over a pit area where the ground may cave in or is unstable.
- Use care when positioning the debris hopper to the dump station. Your vision, especially to the side and rear of the debris hopper may be reduced by the size of the debris hopper. Use mirrors to aid vision. If you cannot see the dump site clearly, stop the truck and examine the area. If necessary, request assistance to guide you while backing the truck into position.
- Never drive with the debris hopper in the raised position. Traveling with the debris hopper in the raised position increases the chances of colliding with overhead obstructions. In addition, the center of gravity of the debris hopper is higher with a raised debris hopper, making the unit more prone to tipping over.

PN SW-DBD-01

2.11 Hazards With Equipment Maintenance

Periodically inspect all moving parts and tighten all fasteners	Stop engine and remove key before conducting maintenance	Secure body with safety prop before doing any maintenance

⚠WARNING Avoid serious injury or death from component failure by keeping implement in good operating condition in performing proper service, repairs and maintenance.

Before Performing Service, Repairs And Maintenance On The Implement:

- SECURE EQUIPMENT FOR SERVICE
- BLOCK OUT POTENTIAL ENERGY HAZARDS; Rotating Parts, Raised Components, Hydraulic Pressure.
- STOP ENGINE, engage parking brake and allow all moving parts to stop and remove key before dismounting from truck seat.
- Securely block up raised equipment. Use large blocks on soft or wet soil.
- PUSH and PULL Remote Hydraulic Cylinder lever to relieve hydraulic pressure.
- DISCONNECT IMPLEMENT Hydraulic HOSES from truck.

WEAR SAFETY GLASSES, PROTECTIVE GLOVES and follow SAFETY PROCEDURES when performing service, repairs and maintenance on the implement:

- Always WEAR protective GLOVES when handling chemicals or worn component with sharp edges.
- Always WEAR GLOVES and SAFETY GLASSES when servicing components
- AVOID CONTACT with hot hydraulic oil or chemicals.
- SECURELY support or BLOCK UP raised implement, framework and lifted components before working underneath equipment.
- STOP any implement movements and SHUT-OFF TRUCK engine before doing any work procedures.
- USE step ladder or raised stands to reach high equipment areas inaccessible from ground.
- ENSURE good footing by standing on solid flat surfaces when getting on implement to perform work.
- FOLLOW manufacturer's instructions in handling oils, solvents, cleansers, and other chemical agents.
- DO NOT change any factory-set hydraulic calibrations to avoid component or equipment failures.
- DO NOT modify or alter implement, functions or components.
- DO NOT WELD or repair rotating components. These may cause vibrations and component failures being thrown from sweeper.

Perform Service, Repairs, Lubrication And Maintenance Outlined In Implement Maintenance Section:

- INSPECT before each use for loose fasteners, worn or broken parts, leaky or loose fittings, missing or broken cotter keys and washers on pins, and all moving parts for wear.
- REPLACE any worn or broken parts with authorized service parts.
- LUBRICATE unit as specified by lubrication schedule
- NEVER lubricate, adjust or remove material while it is running or in motion.
- TORQUE all bolts and nuts as specified.

Safety Shields, Guards And Safety Devices Inspection:

- Maintain Safety Signs in good readable condition.
- REPLACE any missing, broken or worn safety shields, guards and safety devices.
- Engine Exhaust, some of its constituents, and certain vehicle components contain or emit chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.
- Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

PN SW-HM-01

2.12 Federal Laws & Regulations

This section is intended to explain in broad terms the concept and effect of federal laws and regulations concerning employer and employee equipment operators. This section is not intended as a legal interpretation of the law and should not be considered as such.

Employer-Employee Operator Regulations

U.S. Public Law 91-596 (The Williams-Steiger Occupational and Health Act of 1970) OSHA

This Act Seeks:

"...to assure so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources..."

DUTIES

Sec. 5 (a) Each employer-

(1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees;

(2) shall comply with occupational safety and health standards promulgated under this Act.

(b) Each employee shall comply with occupational safety and health standards and all rules, regulations and orders issued pursuant to this Act which are applicable to his own actions and conduct.

OSHA Regulations

OSHA regulations state in part: "At the time of initial assignment and at least annually thereafter, the employer shall instruct every employee in the safe operation and servicing of all equipment with which the employee is, or will be involved.

Employer Responsibilities:

To ensure employee safety during truck and Patcher operation, it is the employer's responsibility to:

1. Train the employee in the proper and safe operation of the truck and Patcher.
2. Require that the employee read and fully understand the truck and Patcher Operator's manual.
3. Permit only qualified and properly trained employees to operate the truck and Patcher.
4. Maintain the truck and Patcher in a safe operational condition and maintain all shields and guards on the equipment.
5. Ensure the truck is equipped with a functional seat belt and require that the employee operator securely fasten the safety belt at all times.
6. Provide the required tools to maintain the truck and Patcher in a good safe working condition and provide the necessary support devices to secure the equipment safely while performing repairs and service.

OSHA 1910.147(c)(1) Energy Control Program

The employer shall establish a program consisting of energy control procedures, employee training and periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, startup or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy source and rendered inoperative.

OSHA 1926.417 Lockout and Tagging

(a) Controls. Controls that are to be deactivated during the course of work on energized or de-energized equipment or circuits shall be tagged.

(b) Equipment and Circuits. Equipment or circuits that are de-energized shall be rendered inoperative and shall have tags attached at all points where such equipment or circuits can be energized.

OSHA 1926.600(a)(3)(ii)

Whenever the equipment is parked, the parking brake shall be set. Equipment parked on inclines shall have the wheels chocked and the parking brake set.

Employee's Responsibilities:

Remove the truck keys and keep them in your pocket before performing any service, maintenance, cleaning or before any person enters into equipment hopper. The truck engine controls must be shut off and prevented from accidental activation.

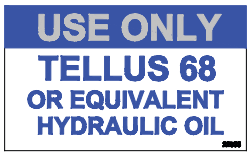
7. Follow all safety rules and regulations.
8. Use all safety equipment as prescribed in Operator's Manual.
9. Report any unsafe conditions.
10. Be aware of and protect the safety of coworkers or others in vicinity.

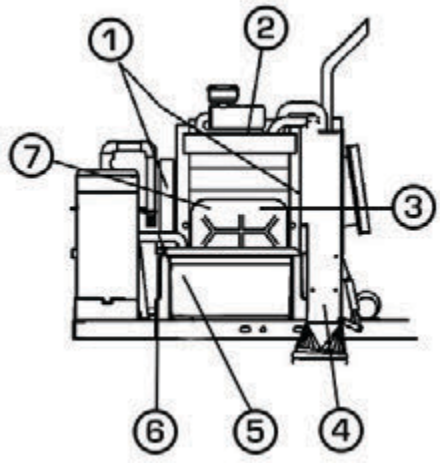
2.13 Safety Decals Locations

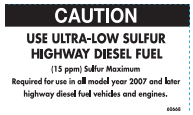
NOTE Schwarze supplies safety decals on this product to promote safe operation. Damage to the decals may occur while in shipping, use, or reconditioning. Schwarze cares about the safety of its customers, operators, and bystanders, and will replace the safety decals on this product in the field, free of charge (Some shipping and handling charges may apply). Contact your Schwarze dealer to order replacement decals.

2.13.1 Power Module (Air Sweepers Only)

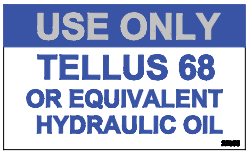
2.13.1.1 Power Module Left Hand Side

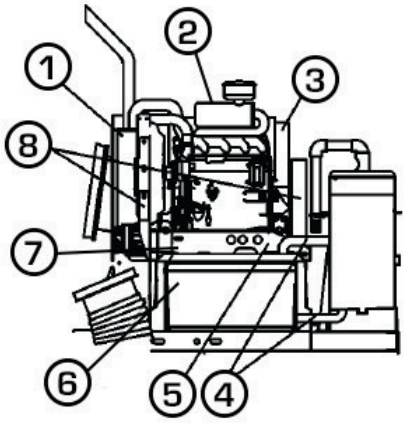
#	Part #	Description	QTY	Visual
1	22536	WARNING - Hands Off	2	
2	22533	IMPORTANT - Tellus 68 Hydraulic Oil	1	
3	29634	DANGER - No Smoking, Flammable Gas	1	
4	22560	WARNING - Do Not Remove Hose	1	
5	22531	IMPORTANT - Water Only	1	
6	22528	CAUTION - No Step	1	



#	Part #	Description	QTY	Visual
7	60668	IMPORTANT - Ultra Low Diesel Fuel Only	1	 CAUTION USE ULTRA-LOW SULFUR HIGHWAY DIESEL FUEL (15 ppm) Sulfur Maximum Required for use in all model year 2007 and later highway diesel fuel vehicles and engines.

2.13.1.2 Power Module Right Hand Side

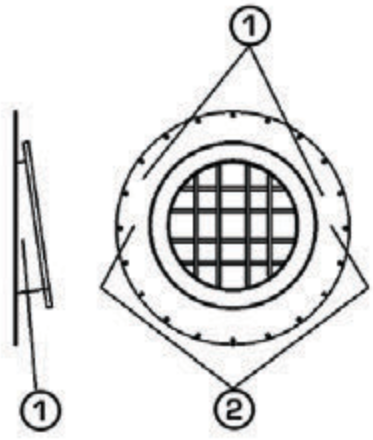
#	Part #	Description	QTY	Visual
1	29635	CAUTION - Hot Liquid Under Pressure	1	
2	22533	IMPORTANT - Tellus 68 Hydraulic Oil	1	
3	28879	WARNING - Without Guard	1	
4	22528	CAUTION - No Step	2	
5	29628	WARNING - Oil Leak Hazard	1	
6	22531	IMPORTANT - Water Only	1	
7	29629	CAUTION - Hot Surface - Stay Away	1	



#	Part #	Description	QTY	Visual
8	22536	WARNING - Hands Off	2	

2.13.1.3 Fan Housing Locations

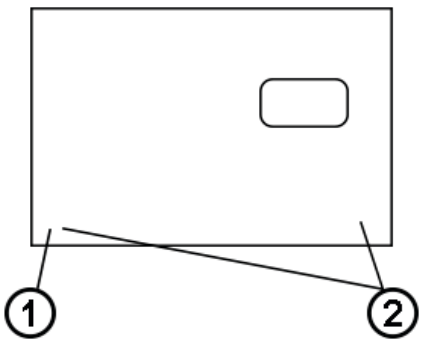
#	Part #	Description	QTY	Visual
1	22536	WARNING - Hands Off	3	
2	22891	WARNING - Fan Blade Hazard	2	



2.13.2 Hopper Locations

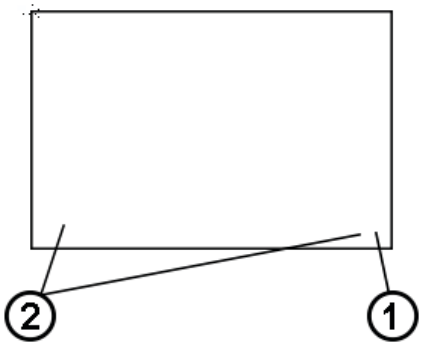
2.13.2.1 Hopper Left Hand Side

#	Part #	Description	QTY	Visual
1	22563	WARNING - Do Not Work (Hopper in Dump Position)	2	WARNING Do not work on vehicle with hopper in dump position! Consult owners manual for proper safety chock installation.
2	22536	WARNING - Hands Off	1	



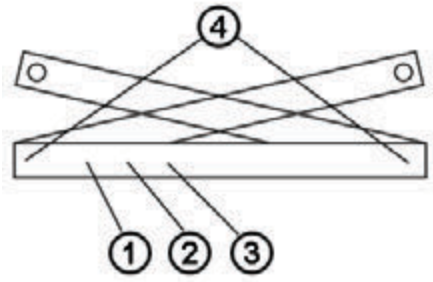
2.13.2.2 Hopper Right Hand Side

#	Part #	Description	QTY	Visual
1	22563	WARNING - Do Not Work (Hopper in Dump Position)	2	
2	22536	WARNING - Hands Off	1	



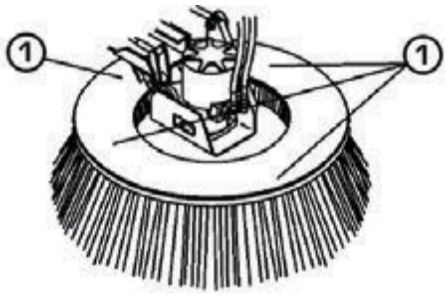
2.13.2.3 Hopper Scissor Lift, Both Sides (High Dump Sweepers Only)

#	Part #	Description	QTY	Visual
1	28885	WARNING - Stay Clear of Lift	1	
2	28879	WARNING - Do Not Operate Without Guard	1	
3	29294	WARNING - Falling Debris	1	
4	22536	WARNING - Hands Off	2	



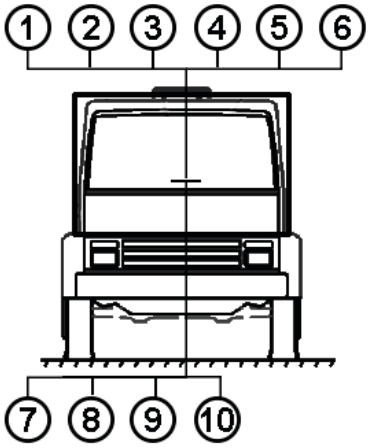
2.13.3 Side Broom Locations, Both Sides

#	Part #	Description	QTY	Visual
1	23258	CAUTION - No Step	4	



2.13.4 In Cab Locations

#	Part #	Description	QTY	Visual
1	22529	CAUTION - Before Unloading	1	
2	22530	WARNING - Sweeping Speed	1	WARNING SUGGESTED SWEEPING SPEED OPEN LOT 0 - 15 MPH CURB LINE 0 - 5 MPH FOR FULL PARTS & SERVICE CALL SCHWARZE IND., INC. TOLL FREE 1-800-879-7933
3	23182	WARNING - Read Manual	1	WARNING To prevent Serious Injury or Death: • Avoid unsafe operations or maintenance. • Do not operate or work on this machine without reading and understanding the operator's manual. • If manual is lost, contact your nearest dealer for a new manual.
4	22825	IMPORTANT - Air Bleeder	2	
5	29154	WARNING - Clearing Obstructions	1	WARNING DO NOT ATTEMPT TO CLEAR OBSTRUCTIONS FROM THE SUCTION INLET TUBE WITH THE HOPPER IN THE RAISED POSITION REMOVE THE FLEXIBLE INTAKE TUBE FROM THE SWEEPING HEAD AND FREE THE TUBE FROM OBSTRUCTIONS
6	29410	IMPORTANT - Daily Inspection Point	1	IMPORTANT DAILY INSPECTION POINT RAISE HOPPER AND INSTALL SAFETY CHOCKS. INSPECT FAN INLET AND FAN BLADES FOR DEBRIS BUILD UP. WASH OUT AS REQUIRED. FAILURE TO KEEP THE FAN CLEAN MAY CAUSE EXCESSIVE VIBRATION LEADING TO PREMATURE COMPONENT FAILURE.
7	29636	WARNING - Spanish Translation	1	
8	29637	WARNING - Remove Engine Keys	2	



#	Part #	Description	QTY	Visual
9	29639	IMPORTANT - Use Genuine Schwarze Parts	1	
10	62225	IMPORTANT - Warning for GB Down Pressure	1	

Section 3 - Pre-Operation

3

In this Section

Pre-Operation Inspection

Side Broom Pattern Check

3.1 Pre-Operation Inspection

This checklist can help avoid any sweeping performance problems if used at the start of every sweeping operation.

This checklist should be used as a guide only, always complete a PRE-TRIP inspection as required by U.S. Department of Transportation (DOT) regulations. We suggest making multiple copies of these two pages so they can be used for regular inspections. Keep the completed forms in a notebook to keep a comprehensive inspection record of your sweeper.

Sweeper Pre-Operation Inspection

Operator Notes:

WARNING Before conducting the inspection, make sure the truck engine is off, all movement has stopped and the truck is in park with the parking brake engaged. Make sure the truck is parked on level ground and all movement of the sweeper has stopped.

Left Side Broom

- □ Broom free of debris, string, wire, etc.
- □ Side broom spray nozzles operational and free of debris
- □ Bristle length no less than 6”
- □ Spring adjustment sufficient to create a 4” strike pattern
- □ Broom pattern 9:00 to 1:00
- □ Broom speed 70 - 75 rpm approximately

Right Side Broom

- □ Broom free of debris, string, wire, etc.
- □ Side broom spray nozzles operational and free of debris
- □ Bristle length no less than 6
- □ Spring adjustment sufficient to create a 4” strike pattern
- □ Broom pattern 11:00 to 3:00
- □ Broom speed 75 – 80 rpm approximately

Pickup Head

- □ Pickup head free of debris and caked on materials
- □ Pickup head spray nozzles operational and free of debris
- □ Pickup head blast orifice at 5/8”
- □ Pickup head spring suspension should require approximately 40# lift per corner to float the head with hopper down and the unit running at operational Rpm’s
- □ Pickup head flap set should extend below the skid plates
- □ Blast hose is clean and securely fastened to the pickup head and is free from holes
- □ Suction hose is clean and securely fastened to the pickup head and is free from holes
- □ The center deflector should be in the center for full width sweeping

Fan & Housing

- □ ¼” clearance should exist between the smallest diameter of the fan inlet scroll and the edge of the back cover plate orifice.
- □ Fan blades are clean and free from debris
- □ Drive Belt correctly adjusted – not slipping
- □ Opening or closing the LEAF BLEEDER can balance the air system for optimum sweeping performance. CLOSED, INCREASES air velocity and the

ability to sweep HEAVY DEBRIS. OPEN decreases the air velocity INCREASING hopper vacuum and is most effective for LIGHT DEBRIS

Hopper

- □ Hopper seals completely with the fan inlet seal and suction tube inlet seal in the lowered position
- □ Hopper screens are clean and free of debris blocking the air flow
- □ Hopper suction inlet tube is clean and free of debris blocking the air flow
- □ Dust separator opens and closes freely with tilt function of the hopper
- □ Inspection door seals are in place and seal properly
- □ Rear hopper seals are in place and seal properly with the door closed and latched
- □ Dump door closes and latches securely making a good seal with the hopper
- □ Hand hose door closes and latches securely making a good seal with the hopper

Skid Plate

- □ Verify skid plate is not bent or damaged
- □ Skid plate to be adjusted to place the blast orifice 2" – 2 ½" above the sweeping surface

Water System

- □ Verify water tank has sufficient water
- □ Verify all nozzles are free of debris and operational

General

- □ Unit is clean and free of tools, loose hardware, debris, etc.

Chassis Truck Pre-Operation Inspection

- □ Inspect the rims and wheel nuts
- □ Check the tires for wear, damage, and pressure
- □ Inspect and check the braking system
- □ Inspect and check the steering system
- □ Inspect the suspension system
- □ Inspect the exhaust system
- □ Check the fuel level
- □ Check the chassis engine oil and radiator fluid levels
- □ Inspect the engine air cleaners
- □ Check the transmission fluid level
- □ Check the battery
- □ Inspect all engine drive belts for wear
- □ Check the windshield washer fluid level
- □ Check operation of all lights and beacons
- □ Adjust the mirrors
- □ Verify that all emergency equipment is present

Sweeper ID#:_____ Make: ***Schwarze A8 Twister***_____

Truck ID#:_____ Make: _____

Date:_____ Shift: _____

Operator's Signature: _____

Operator Notes:

3.2 Side Broom Pattern Check

The side broom pattern is the pattern of marks left on a sweeping surface after the sweeper has passed over it. You should check this pattern to verify the following conditions:

• That the broom is reaching the sweeping surface

• That the left-broom pattern is a 9-to-1 o'clock contact

• That the right-broom patter is an 11-to-3 o'clock contact.

Inspection:

1. Move the sweeper to a flat asphalt or concrete sweeping surface and start the auxiliary engine.

2.Turn the side broom(s) on.

3. Allow the broom(s) to run in contact with the sweeping surface for about a minute or so.

4. Turn the side broom(s) off.

5. Raise the side broom(s).

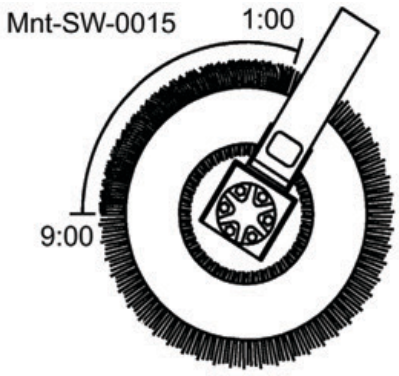
6. Reverse the sweeper several feet to expose the surface just swept.

7. Turn off the truck engine and set the parking brake.

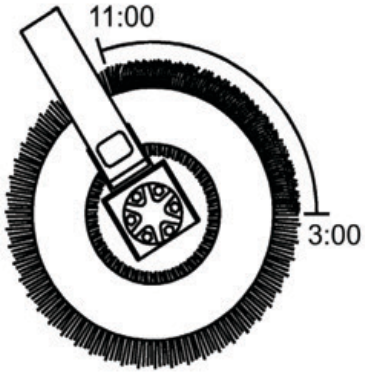
8. Get out of the cab and inspect the broom pattern.

The left broom should have left a 9-to-1 o'clock contact mark on the surface and the right broom should have left a 11-to-3 o'clock contact with the surface.

If either pattern is irregular, the corresponding side broom tilt or down-pressure needs adjustment.



Left Side Broom



Right Side Broom

Section 4 - Operations

How your Schwarze A8 Twister sweeper works

The Schwarze A8 Twister high dump air sweeper is mounted on a standard production truck chassis and uses a 'closed loop' to pickup debris from the pickup head.

The sweeper unit is powered by an auxiliary engine mounted on the sweeper frame. This engine propels a fan that draws air from the hopper and forces it down the pressure hose.

This air is then funneled across the front of the chamber, and out a slot, called the 'blast orifice.' As the air is pushed through the blast orifice, it is transformed into a high velocity stream that blasts forward and downward onto the sweeping surface in the pickup head's lower/front chamber.

The sheer force of this air loosens debris, then picks it up and pushes it across the pickup head in a spiraling motion and moves it towards the suction inlet on the vacuum side of the pickup head.

A series of flexible rubber flaps, called 'curtains,' are on the front and back of the pickup head. These curtains, along with the metal skid plates on each end, contain the high velocity air within the pickup head.

The vacuum inside the hopper, caused by the fan, pulls the debris up through the suction hose and into the hopper.

Once inside the hopper, a number of strategically placed water nozzles can be activated to decrease the amount of airborne dust.

As the dust comes in contact with the water, it will become heavy and also fall to the bottom of the hopper.

The air is then drawn through a screen to remove any remaining lighter debris. Any fine dust particles that might still remain after that are pulled into a dust separator.

The fan then draws the cleaned air from the dust separator back into the fan housing.

And the cycle begins again.

4

In this Section

Understanding The Sweeping Control Switches

Understanding The Hopper Control Joystick

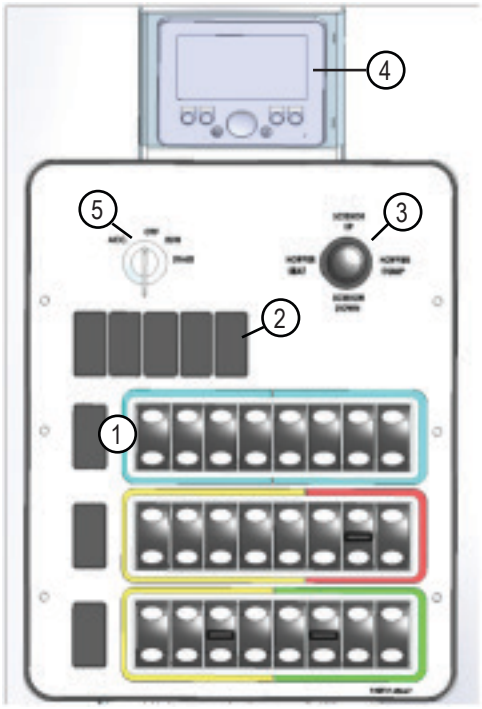
Understanding The Display Module

Auxiliary Engine Start-up

Additional Optional Equipment

Sweeping Operation

End of Shift Cleanup and Maintenance



1. Control Switches
2. Additional Optional Switches
3. Hopper Control Joystick
4. Display Module
5. Auxiliary Engine Ignition Key

The A8 Twister sweeping functions are operated from a swivel control console inside the truck cab. This console consist of control switches, auxiliary engine ignition switch, hopper control joystick, and display module with auxiliary engine controls.

Three rows of eight sealed back-lit rocker switches with text and icon labeling are grouped into 5 sections designated by different color bands.

The display module shows a series of engine gauges, fluid levels, status indicators, warning messages, and additional operational data.

The console also provides areas for additional optional equipment switches.

Swivel the control console

To swivel the control console for a most comfortable operation, locate the lever located underneath the control console.

Pull the lever to the left and swivel the console left or right and release the lever when the desired position is found.

4.1 Understanding The Sweeping Control Switches

The A8 Tornado utilizes “smart” control switches. When the control console is activated, all the switches will turn a blue color indicating the function is ready for activation.

When a toggle switch is pushed in the “on” position, depending on the function direction, either the bottom or the upper half of the toggle switch will turn red.

4.1.1 Water Controls

The A8 Twister water system is immediately available when the auxiliary engine is switched on.

1. HI PRESS - High-pressure wash down *(4.1.1.1)*
2. HPR WTR - Hopper water *(4.1.1.2)*
3. LGB WTR - Left side broom water *(4.1.1.2)*
4. RGB WTR - Right side broom water *(4.1.1.2)*
5. HEAD WTR - Pickup head water *(4.1.1.2)*
6. FRNT SPRAY - Front spray bar water *(4.1.1.2)*
7. HOP SPRAY - Hopper spray bar water *(4.1.1.2)*
8. INT WTR - Intake tube water *(4.1.1.2)*

4.1.1.1 High Pressure Washdown (if equipped)

This switch turns the high volume washdown hose on or off. The washdown hose allows the operator to clean the sweeper while in the field when external water sources are unavailable. The washdown hose spray nozzle can be set from a wide spray to a narrow high pressure stream when needed.

IMPORTANT Before starting, all sweeper functions must be turned off, engine ignition key on and engine running in standby.

Turning the high pressure washdown on

- Locate the switch on the cab console control panel.
- Press the toggle switch to the “up” position.

Turning the high pressure washdown off

- Press the toggle switch to the “down” position.

4.1.1.2 Dust Suppression System Operation

These switches turn desired water spray nozzles on and off where dust suppression is needed during a sweeping operation. The A8 Twister is equipped with a number of convenient located water spray nozzles.

NOTE This function requires the auxiliary engine ignition key to be turned on.

Turning spray nozzles on

- Locate the desired water switch on the cab console control panel.
- Press the toggle switch to the “up” position.

Turning spray nozzles off

- Press the toggle switch to the “down” position.

NOTE This is a standby controlled function.

4.1.2 Lighting and Regenerative Air Controls

1. LGB LT - Left side broom light *(4.1.2.1)*
2. RGB LT - Right side broom light *(4.1.2.1)*
3. STROBE LT - Dump Lights: front, side and rear *(4.1.2.1)*
4. BEACON LT - Beacon (if equipped) *(4.1.2.1)*
5. ALT FLASH - 4 way flasher *(4.1.2.1)*
6. BLEEDER - Bleeder door operation *(4.1.2.2)*
7. HEAD - Pickup head operation *(4.1.2.3)*
8. STANDBY - Sweeper standby *(4.1.2.4)*

4.1.2.1 Lighting Controls

These switches turn desired lights on and off. To increase operational safety and better visibility, the A8 Twister is equipped with a number of convenient located lighting options.

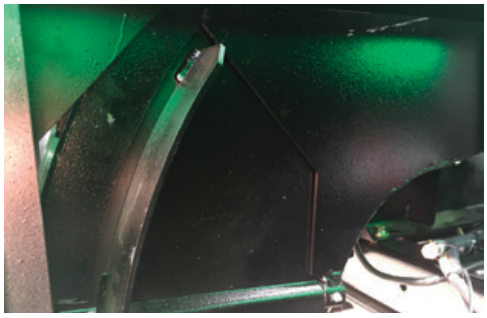
Turning lights on

- Locate the desired light or flasher switch on the cab console control panel.
- Press the toggle switch to the “up” position.

Turning lights off

- Press the toggle switch to the “down” position.

4.1.2.2 Bleeder Door Operation



This switch opens and closes the bleeder door located in the exhaust of the fan housing. The bleeder door, is normally closed but in instances of light debris or leaves, the bleeder door can be opened for better sweeping functionality.

NOTE Use of this function requires the auxiliary engine to be turned on.

Opening the bleeder door

- Locate the bleeder door switch on the cab console control panel.
- Press the toggle switch to the *"down" position*.
- Press repeatedly or continue to hold the switch until the bleeder door has reached the desired position.

The status indicator screen will display the percentage of the bleeder door position. (*See section 4.4.1.8 Main Indicator Area*)

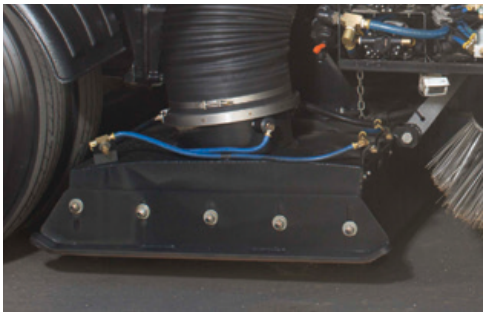
Closing the bleeder door

- Press the toggle switch to the *"up" position*.
- Press repeatedly or continue to hold the switch until the bleeder door has reached the desired or fully closed position.

NOTE It takes about eight seconds for the bleeder door to reach its fully open or closed position. However, the door may be positioned at any point between fully open or fully closed.

NOTE Using excess water to dampen leaves and other light debris tends to make them stick to the sweeping surface. Sometimes neither the blast force nor the vacuum suction can remove every bit of lightweight debris in this condition.

4.1.2.3 Pickup Head Operation



This switch lowers and raises the pickup head located at the underside of the sweeper. The pickup head is the actual sweeping component of the Schwarze A8 Twister.

NOTE Use of this function will automatically activate the auxiliary hydraulic pump if the auxiliary engine is off.

Lowering the pickup head

- Locate the switch on the cab console control panel.
- Press the toggle switch to the *"down" position*.

If the sweeper engine is off, you will need to continue to hold the switch until the pickup head rests fully on the sweeping surface.

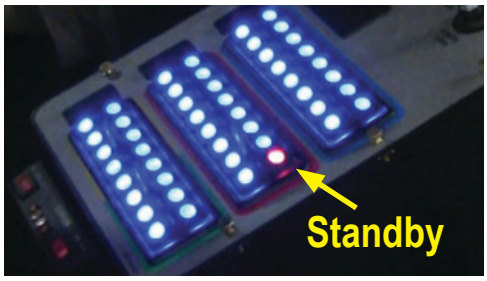
Raising the pickup head

- Press the toggle switch to the *"up" position*.

If the sweeper engine is off, you will need to continue to hold the switch until the pickup head has fully retracted against the up-stops.

NOTE This is a standby controlled function

4.1.2.4 Sweeper Standby



Sweeper standby activates the sweeping system, and de-activates or re-activates all the functions that are selected during the sweeping operation.

The sweeper standby controls the side brooms, pickup head, the water functions you have activated and the selected auxiliary engine speed.

After starting the chassis and auxiliary engine, the sweeper standby switch will flash red, indicating the standby system is functioning correctly.

Activating the sweeping system

- Locate the switch on the cab console control panel.
- Press the toggle switch to the *"up" position*

This allows the sweeping functions to be operated, and you may now start your regular sweeping operation.

Engaging the sweeper standby

- Press the toggle switch to the *"down" position.*

This will turn off and raise the side brooms, raise the pickup head, turn off all water selections and lower the auxiliary engine speed to idle.

NOTE When engaged, the bottom half of the standby switch will blink green and the standby icon will appear on the display panel.

NOTE Standby mode is automatically engaged when the truck is put in reverse.

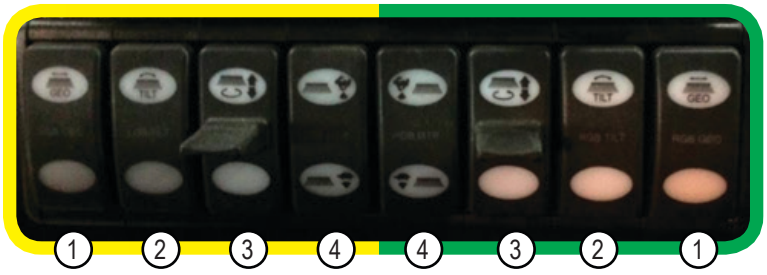
Dis-engage sweeper standby

- Press the toggle switch to the *"down" position again*.

This will return the sweeper in "sweep mode", re-activating the side brooms, pickup head, all water functions that were previously set, and will return the auxiliary engine to the previously selected speed, and you may now continue your regular sweeping operation.

NOTE If at this point you would rather de-activate the sweeper standby system instead of resuming sweeping operations, toggle the switch to the *"up" position.*

4.1.3 Side Broom Controls



1. LGB/RGB GEO - Side broom extension override (GEO[sm]) *(4.1.3.1)*
2. LGB/RGB TILT - Side broom tilt *(4.1.3.2)*
3. LGB/RGB - Side broom operation *(4.1.3.3)*
4. LGB/RGB MTR - Side broom speed *(4.1.3.4)*
5. LGB/RGB PRESS (not shown) - Side broom down pressure *(4.1.3.5)*

4.1.3.1 Side Broom Extension Override (if equipped)

These two switches activate the left or right side broom extension override and allow the operator to override the side broom extension and retract it from its normal operating position inward under the truck so it can scrub the surface in front of the pickup head.

NOTE Use of this function requires the side broom to be on the surface and spinning.

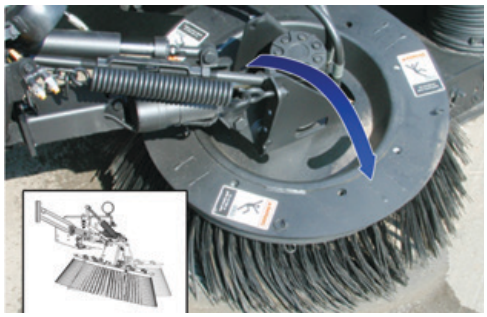
Activating GEO and retracting the side broom

- Locate the switch on the cab console control panel.
- Press the toggle switch in the *"up" position.*

Returning the side broom to its extended sweeping position

- Press the toggle switch in the *"down" position.*

4.1.3.2 Side Broom Tilt (if equipped)



If your sweeper is not equipped with this option, please refer to "Adjusting the Manual Side Broom Tilt" in the service section of this manual.

These two switches control the left or right side broom tilt. The side broom tilt allows the operator to adjust the side broom tilt without having to exit the sweeper and manually adjust the tilt.

NOTE Use of this function requires the side broom to be on the surface and spinning.

Tilting the side broom

- Locate the switch on the cab console control panel.
- Press the toggle the switch to the *"up" position.*
- Continue to hold the switch until the desired side broom tilt has been established.

Returning the side broom to its normal level position

- Press the toggle switch to the *"down" position.*
- Continue to hold the switch until the side broom has returned to its normal level operating position

NOTE For optimum travel clearance, always return the side broom to its normal level operating position before retracting the broom.

4.1.3.3 Side Broom Operation

NOTE Use of this function requires the auxiliary engine to be turned on.

These two switches activate the left or right side broom. The main purpose of the side brooms is to loosen debris from the surface and direct it into the path of the pickup head.

NOTE The A8 Twister side brooms are "full floating". When obstacles are encountered, the side broom will automatically pivot inwards temporarily until returning to its original sweeping position.

Starting the side broom

- Locate the switch on the cab console control panel.
- Press the toggle switch once to the *"down" position.*

The side broom will lower to the surface, extend and start spinning.

NOTE The A8 Twister side brooms always remain full contact with the pavement. As broom bristles wear away, the broom lowers to maintain contact with the surface.

Temporarily stopping the side broom rotation

- Press the toggle switch again once to the *"down" position*.

The side broom will keep contact with the surface, but will stop spinning.

To resume the side broom again, toggle the switch once again in the *"down" position*.

Stopping and retracting the side broom

- Press the toggle switch once to the *"up" position*.

The side broom will raise from the ground, retract and stop spinning.

NOTE This is a standby controlled function.

4.1.3.4 Side Broom Speed

NOTE Use of this function requires the side broom to be on the surface and spinning.

These two switches control the left or right side broom speed.

Increasing the side broom speed

- Locate the switch on the cab console control panel.
- Press the toggle switch in the *"up" position*.
- Press repeatedly or continue to hold the switch until the desired side broom speed has been established or until the broom is spinning at full speed.

Reducing the side broom speed

- Press the toggle switch in the *"down" position*.
- Press repeatedly or continue to hold the switch until the desired side broom speed has been established or until the broom has stopped spinning.

4.1.3.5 Side Broom To Pavement Contact (Down Pressure) (if equipped)

If your sweeper is not equipped with this option, please refer to "Adjusting the Manual Side Broom To Pavement Contact/Down Pressure" in the service section of this manual.

Valves located in the cab area control the amount of left or right side broom contact with the pavement.

NOTE Use of this function requires the auxiliary engine to be turned on, the side broom operation switch to be toggled in the *"on" position* and the side broom to be on the surface.

Applying more side broom to pavement contact (more down pressure)

NOTE Releasing air pressure increases the amount of broom to pavement contact.

- Turn the valve in a counter-clockwise direction.
- Continue to turn the valve to increase broom to pavement contact until the desired amount of broom contact with the pavement has been established.
- A gauge located near the valve will indicate the applied air pressure.

Applying less side broom to pavement contact (less down pressure).

NOTE Increasing air pressure decreases the amount of broom to pavement contact.

- Turn the valve in a clockwise direction.
- Continue to turn the valve to decrease broom to pavement contact until the desired amount of broom contact with the pavement has been established.
- A gauge located near the valve will indicate the applied air pressure.

4.1.4 Additional Optional Switches

Your A8 Twister may be equipped with a variety of additional switches.

4.1.4.1 Magnet Bar (if equipped)

This switch lowers or raises the magnet bar, located at the front of the sweeper truck. The main function of the magnet bar is to remove metal objects that may cause damage to the truck tires.

NOTE Use of this function requires the auxiliary engine to be turned on.

Lowering the magnet bar

- Locate the switch on the cab console control panel.
- Press the toggle switch in the *"down" position*.
- Continue to hold the switch until the magnet bar is fully lowered.

The magnet bar will automatically stop when it reaches the proper distance from the ground.

Raising the magnet bar

- Press the toggle switch in the *"up" position*.
- Continue to hold the switch until the magnet bar has fully retracted against the up-stops.

NOTE Unless equipped with a self dumping magnet, objects that were picked up must be manually removed from the magnet.

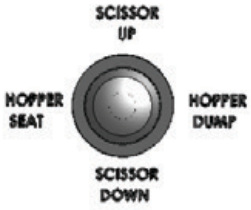
Self dumping magnet (if equipped).

This switch releases objects that were previously picked up by the magnet bar.

Releasing (dump) objects from the self dumping magnet.

- Locate the switch on the cab console control panel.
- Press the toggle switch in the *"down" position*.

4.2 Understanding The Hopper Control Joystick



The hopper scissor lift and dump functions are controlled by the hopper control joystick.

NOTE Use of the joystick automatically activates the auxiliary hydraulic pump if the auxiliary engine is off.

The joystick operates in four directional functions.

Scissor Up: Push the joystick up to deploy the rear stabilizers to full stroke and extend the hopper scissor lift to the desired dump height.

NOTE The hopper will start to raise as soon as the rear stabilizers have fully extended.

NOTE The hopper will not raise unless the sweeper is at a safe level surface and the debris inside the hopper has not exceeded the maximum amount of weight to safely raise the hopper.

Scissor Down: Push the joystick down to lower the hopper scissors lift to its regular sweeping position and retract the stabilizers to their stored position.

Hopper Dump: Push the joystick to the right to open the hopper door and tilt the hopper to the right side of the truck to its dump position.

NOTE This function operates in either the high-dump or low-dump scissor conditions. The hopper vibrator (if equipped) will activate for 20 seconds after the joystick is activated to help dump the hopper.

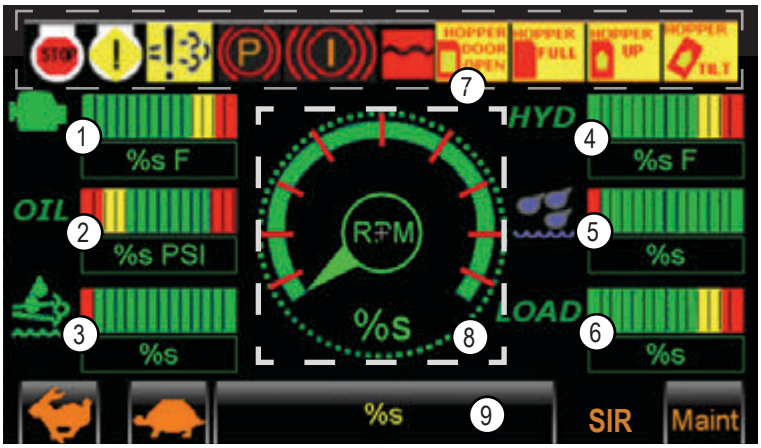
NOTE The hopper will not dump unless the sweeper is at a safe level surface and the debris inside the hopper has not exceeded the maximum amount of weight to safely dump the hopper.

Hopper Seat: Push the joystick left to close the hopper door and return the hopper to its regular level position.

4.3 Understanding The Display Module

The display module on the A8 Twister has an auxiliary engine indicator screen that displays various screens of conditions, functions and alarms. It provides an area with buttons for auxiliary engine controls.

4.3.1 Status Indicator Screen



1. Auxiliary Engine Coolant Temperature Indicator
2. Auxiliary Engine Oil Pressure Indicator
3. Auxiliary Engine Diesel Emission Fluid (DEF) Level Indicator
4. Hydraulic Oil Temperature Indicator
5. Dust Control Water Level Indicator
6. Hopper Load Indicator
7. Warning and Message Indicator Area *(4.3.1.1)*
8. Main Indicator Area *(Engine Speed Gauge Shown) (4.3.1.2)*
9. Engine Load and Fuel Use Indicator

4.3.1.1 Warnings and Message Indicator Area

The warning and message indicator area can display various warning and operational information.

Auxiliary Engine Shutdown Required

Auxiliary Engine Fault Code Has Been Set

Parking Brake Applied.

When shown, the chassis truck parking brake has been applied.

Sweeper in Standby Mode

When shown, the sweeper is currently in standby mode. *Please refer to the section 4.1.2.4 for function details.*

Hydraulic Level Low

When shown, the Hydraulic levels are low. *Please refer to the maintenance section for details.*

Hopper Door Open

When shown, the hopper door is currently open. *Please refer to the section 4.2 for function details.*

Hopper Full

When shown, the hopper has exceeded the high-dump lift capacity and dumping of hopper can only be performed from ground level. *Please refer to the section 4.2 for function details.*

Hopper Up

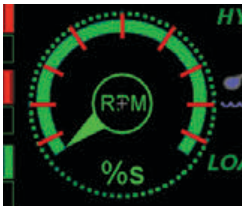
When shown, the hopper is currently in the raised position. *Please refer to the section 4.2 for function details.*

Hopper Tilt

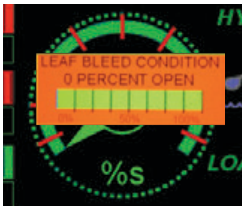
When shown, the hopper is currently tilted. *Please refer to the section 4.2 for function details.*

4.3.1.2 Main Indicator Area

The main indicator area can display various warning and operational information.



Auxiliary Engine Speed Gauge



Bleeder Door Position Indicator

When shown, the bleeder door has been activated and the current position is displayed and will remain on screen for 2 to 3 seconds after the switch is released. *Please refer to the section 4.1.2.2 for function details.*

Hi Dump Angle Warning

When shown, the A8 Twister is not on level ground and has almost reached its maximum sideways inclination. *Please refer to the section 4.2 for function details.*

Unsafe Dump Angle Condition

When shown, the A8 Twister is not on level ground and has reached the maximum sideways inclination. The scissor up function has been disabled at this point. *Please refer to the section 4.2 for function details.*

NOTE The scissor down function will still work.

Outriggers Down

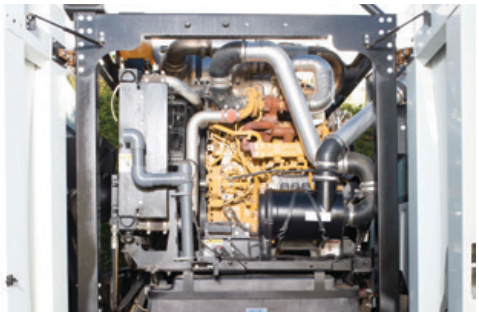
When shown, the sweeper stabilizer outriggers are fully extended to ground level and hopper may be raised. *Please refer to the section 4.2 for function details.*

NOTE The A8 Twister safety system will keep the hopper from being raised by disabling the scissor up function even when outriggers are fully extended. Please refer to the "*Unsafe Dump Angle Condition" message for details.*

4.3.2 Auxiliary Engine Controls

1. Auxiliary Engine Speed Controls *(4.4.2.1)*
2. Sweeps-In-Reverse Selection *(4.4.2.2)*
3. Maintenance and Additional Screens *(4.4.2.3)*
4. ESC - Return To Previous Screen
5. Menu Navigation Pad (4.4.2.4)
6. OK - Item Select
7. System Status Indicator (4.4.2.5)

4.3.2.1 Auxiliary Engine Speed Controls



Increase auxiliary engine speed

- Push the left button (indicated with a rabbit icon immediate above the button) to increase the auxiliary engine speed by 100 RPM increments.
- Press repeatedly or continue to hold the button to increase the engine RPM to the desired engine speed or to full throttle.

Reduce auxiliary engine speed

- Push the right button (indicated with a tortoise icon immediate above the button) to reduce the auxiliary engine speed by 100 RPM increments.
- Press repeatedly or continue to hold the button to reduce the engine RPM to the desired engine speed or to idle position.

4.3.2.2 Sweeps-In-Reverse Selection

NOTE This function may have been disabled at customer's request.

By default, when the A8 Twister is put in reverse, the side brooms and pickup head are automatically raised, side brooms are turned off and the auxiliary engine is placed in idle.

If the Sweeps-in-reverse function is activated, putting the sweeper in reverse will raise the side brooms but will leave the head down and the engine running at current speed.

Activate Sweeps-In-Reverse

- Push the sweeps-in-reverse selection button (indicated with SIR immediate above the button)

The SIR icon will be highlighted green immediately above the button.

The pickup head and auxiliary engine will now be unaffected when in reverse.

NOTE The sweeper standby function is not be available in sweep-in-reverse.

Disabling Sweeps-In-Reverse

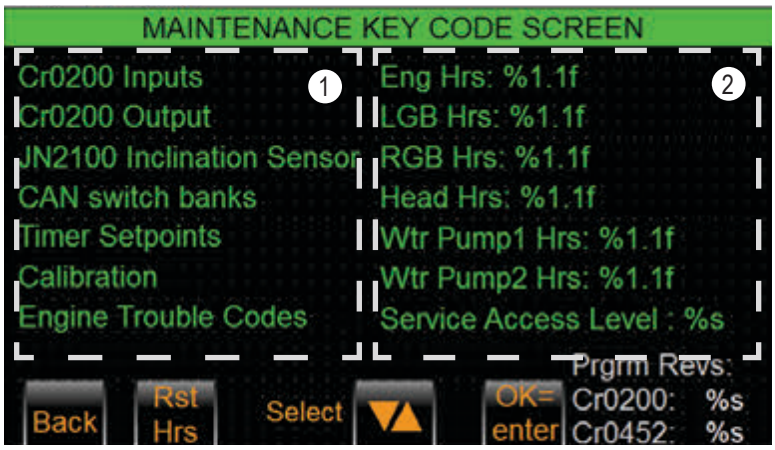
- Push the sweeps-in-reverse selection button.

The highlighted green portion of the SIR icon will disappear above the button.

The pickup head will now be raised and auxiliary engine will be put in idle when in reverse.

NOTE Putting the sweeper back in forward will automatically return the side brooms and pickup head to their previous positions and the auxiliary engine will return to its previous speed.

4.3.2.3 Maintenance and Additional Screens



1. Technician Service Options
2. Sweeping Equipment Meters

Pressing the maintenance button directly underneath the "MAINT" indication on the display module screen will provide the "Maintenance Key Code Screen" area.

Resetting equipment hour meters

The sweeping equipment hour meters can be reset by using the menu navigation pad to the desired hour meter and pressing the button directly underneath the "Rst Hrs" indication on the screen.

NOTE Engine hours (Eng Hrs) can not be reset.

4.3.2.4 Menu Navigation

The display module uses a menu navigation pad to navigate around the available screen options.

Selecting a screen option.

To select a screen option, push the navigation pad in one of the four directions until the desires option is highlighted. Select the option by pressing the "OK" button.

Going back to a previous screen.

Go back to a previous screen or option, by pressing the button directly underneath the “Back” indication on the display module.

4.3.2.5 System Status Indicator

The system status indicator light will blink green, indicating normal operation of the display module.

4.3.3 Camera System

To increase the operator’s field of vision, a camera system is installed on the A8 Twister.

Standard, one camera is mounted at the rear of the hopper to view what is directly behind the sweeper. In a multi-camera system, the picture on the camera system automatically switches to the rear view when the sweeper is shifted into reverse.

Two additional cameras (if equipped) are mounted near the left and right side broom. This allows observation of the side broom operation as well as provide a view of approaching curb line obstacles.

Each camera view can be displayed by pressing the “Scan” or ”Camera Select” buttons on the camera display system.

For additional camera functionality or camera system troubleshooting please refer to the camera system manufacturer’s owner’s manual, which is provided with the A8’s sweeper manual set.

4.4 Auxiliary Engine Start-up

⚠WARNING Before starting the auxiliary engine in a confined area, verify that proper outlet exhaust ventilation equipment is installed. Always use safety approved fuel storage and piping.

Starting the auxiliary engine

- Turn the key switch clockwise.
- When the engine starts, release the key so that it returns to the “Run” position.

IMPORTANT If you release the key switch before the engine starts, to prevent damage to the engine, you must wait until the engine comes to a complete stop before attempting to restart.

- Check all gauges for normal engine operation. If operation is not normal, stop the engine and notify your supervisor.

Engine Oil Pressure

Normal engine oil pressure should be 380 ± 103kPa (3.80 bar ± 1.03 bar; 55 ± 15 PSI) at rated full-load speed (1800 - 2500 RPM) with oil at normal operating temperature of 105°C (220°F).

If the gauge needle does not rise above the minimum oil-pressure specification of 103 kPa (1.03 bar; 15 PSI) within 5 seconds, stop the engine and notify your supervisor.

Coolant Temperature Gauge.

Normal engine coolant temperature range is 82° - 94°C (180°-202°F).

IMPORTANT Do not place the engine under full load until it is properly warmed up.

Warming the engine

To assure proper lubrication, warm the engine by operating it at 1200 RPM with no load for 1 to 2 minutes.

IMPORTANT When operating at temperatures below freezing, extend this period to 2 to 4 minutes.

Idling the auxiliary engine

IMPORTANT Avoid unnecessary engine idling and never allow the engine to idle longer than 5 minutes. Prolonged idling could cause crankcase oil dilution, formation of gummy deposits, engine sludge and unburned fuel in the exhaust system

Slow idle for this engine is set at 850 RPM at the factory. If you must leave the engine running more than 3 to 4 minutes, make sure the engine speed is at 1200 RPM.

Recommended auxiliary engine speeds:

Light sweeping operation	1600-1800 RPM
Normal sweeping operation	1800-2000 RPM
Heavy sweeping operation	2000-Full RPM

IMPORTANT We advise operating the engine under a lighter load and at lower speeds than normal for the first few minutes after start-up.

NOTE This is a standby controlled function

4.5 Additional Optional Equipment

Your A8 Twister may be equipped with a variety of additional optional equipment.

4.5.1 Hand Hose (if equipped)

The hand hose is mounted on a hydraulic boom hinged to the right rear of the sweeper. The hose operates via suction within the hopper.

Operating the hand hose

- Locate the block-off plate in its storage location.
- Raise the hopper.
- Place pickup head block-off plate over the pickup head's transition hose opening on the driver's side of the sweeper.

⚠WARNING Never put the block-off plate in place while the engine is running.

- Lower the hopper.
- Unhook the cords that hold the hose and tube to the brackets.
- Release the rubber straps that hold the hose and aluminum nozzle to the support.
- Use the hand hose door latch located in the back of the sweeper to reveal the suction door opening.
- Swing the hand hose end in place flat against the opening and lock the hand hose latches.
- Use the control switch to lift the boom out of its cradle. Swing the boom out and away from the rear of the hopper.

NOTE If a straight drop into a catch basin is required, hang the tube directly over the hole to operate in a straight vertical position.

The hand hose is now ready for use.

NOTE When using the hand hose in or around water, do not hold the end of the nozzle completely under the water surface. Doing so will result in the loss of suction.

Re-seating the hand hose

- Use the control switch to re-seat (stow) the hand hose by swinging and holding the boom over the cradle and lowering the boom
- Use the hand hose door latch to close the suction door opening.
- Release the hand hose latches and swing open the hand hose end.
- Re-attach the rubber straps that hold the hose and aluminum nozzle to the support.
- Hook up the cords that hold the hose and tube to the brackets.
- Raise the hopper.
- Remove the pickup head block-off plate from the pickup head's transition hose opening on the driver's side of the sweeper.

⚠WARNING Never remove the block-off plate while the engine is running.

- Return the block-off plate to its storage location.
- Lower the hopper.

4.5.2 Hopper Drain (if equipped)

The hopper drain, located in the rear of the hopper, offers the option to drain liquid from the hopper, such as rain water, to reduce load weight during wet weather and allow longer dumping intervals.

NOTE Local rules and regulations may require that liquid picked up by the sweeper be removed at the dump site.

4.5.3 Hopper Deluge (if equipped)

The hopper deluge, located in the rear of the hopper, allows a $2^{1/2"}$ fire hose connected to a fire hydrant to be connected to the hopper and allow the inside of the hopper and hopper screen to be cleaned with a massive amount of pressurized water. The Schwarze Deluge blasts free dirt and stubborn grime adhering to the inside and drastically shortens sweeper cleanup.

NOTE Local rules and regulations may restrict you from using a fire hydrant for cleaning purposes.

4.6 Sweeping Operation

Dual Steering

NOTE For sweepers with dual steering. It is recommended to operate the sweeper from the left side of the chassis while transporting the sweeper at traffic speeds.

Before starting a sweeping job.

- Stop the truck in a safe area and set the parking brake.
- Take the truck transmission out of gear and put in neutral.
- Toggle the chassis dual steering switch so that the right steering position is empowered.
- Realign the sweeper's mirrors for the right hand steering position.
- Start the truck chassis

Starting the sweeper

NOTE The A8 Twister requires the truck key to be turned on before the auxiliary engine can be started.

- Using the console key, start the auxiliary engine.

NOTE The auxiliary engine will always start in the idle position.

The sweeper standby toggle switch will begin flashing red. Press the standby toggle switch to enable the system and allow sweeping functions to be operated. Please refer to section *4.1.2.8 Sweeper Standby* for details.

- Begin your sweeping job.

4.7 End of Shift Cleanup and Maintenance

Your new A8 Twister sweeper has been quality engineered to provide years of dependable service. End of shift cleanup is a major factor in keeping your unit in like-new condition.

NOTE Allow at least half an hour at the end of a day's sweeping to properly clean the unit.

Cleaning is an important part of any maintenance program because it extends the life of the sweeper by reducing rust and abrasion. Additionally this gives the opportunity to inspect for any damaged or worn parts needing service or replacement.

Generally, a high volume of water cleans best; using a fire hose with a high-velocity nozzle is the quickest and simplest cleaning method. Other slower cleaning methods include the optional high volume wash down nozzle or regular garden hose.

- Lower hopper to ground level and tilt hopper
- Start the side brooms and temporarily stop them from spinning
- Thoroughly hose down the brooms, center dirt deflector, pickup head and hopper.
- While the hopper is raised, wash the inside of the pickup head's suction hose.
- Retract side brooms to their travel positions.
- Turn off the auxiliary and chassis engine.
- Hose down the unit to completely rinse away all dirt and dust.

IMPORTANT Do not spray water directly onto the engine components or fan shaft bearing.

- Clean away debris that may have become wound around the side brooms.
- Lubricate all daily lubrication points
- Check the odometer and hour meter and perform any other needed lubrication.
- Inspect the sweeper for loose hardware, oil leaks, burned-out bulbs or fuses, tire wear and inflation, and so on.
- Report any problems to your supervisor.

DANGER

Before starting end of shift cleanup, always verify that:

- The truck is out of gear.
- The parking brake is engaged.
- Hopper safety props are into position.

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Section 5 - Troubleshooting

Troubleshooting your Schwarze sweeper

Schwarze sweepers are carefully designed and built with quality materials and should be maintained using quality parts. These parts are made and tested to Schwarze specifications.

Non-genuine “will fit” parts do not consistently meet these specifications. The use of “will fit” parts may reduce the sweepers performance, void warranties, and present a safety hazard. Use genuine Schwarze sweeper parts for economy and safety.

5

In this Section

Troubleshooting the Sweeping System

Troubleshooting the Sweeper Engine

Troubleshooting the Water System

Troubleshooting the Hydraulic System

Troubleshooting the Side Brooms

Troubleshooting the Camera System

Troubleshooting the Automatic Shutdown System

5.1 Troubleshooting the Sweeping System

Problem	Possible Cause	Remedy
Loss of Vacuum or Not Picking Up Debris	Sweeping too fast	Slow down
	Auxiliary engine speed too low	Increase auxiliary engine speed
	Head not fully lowered	Lower head completely
	Skid plates out of adjustment	Adjust skid plates
	Worn pickup head flaps	Replace flaps
	Faulty seal (fan, intake or door)	Replace Seal(s)
	Torn hose(s)	Replace hose(s)
	Improper head spring tension	Adjust head spring tension
	Bent or uneven drag arms	Straighten or replace drag arm
	Blast orifice too wide	Be sure orifice is roughly 5/8’
	Blast orifice blocked	Remove blockage from opening
	Blocked intake inlet	Remove hose and clean debris from intake inlet
	Blocked screen	Remove blockage
	Blocked intake tube	Remove blockage
	Loose drive belt	Tighten belt
	Low auxiliary engine RPM	Seek service
	Bleeder door open	Close bleeder door
	Worn Fan	Replace fan
	Fan not located properly within fan housing	Adjust fan or back plate
	Holes in hopper or fan housing	Repair holes
	Blast orifice distance to pickup head incorrect	Adjust skids
Excessive Runner Wear or Head Not Gliding Properly	Improper head spring tension	Adjust head spring tension
	Bent or uneven drag arms	Straighten or replace drag arms
	Improper side plate adjustment	Adjust side plates
	Bent head channel	Straighten or replace head channel
Head Drifting Down	Leaking pickup head cylinder seal	Rework seals
	P. O. check valve stuck open	Replace or clean
Unusual Noise or Vibration	Worn bearings	Replace bearing(s)
	Fan out of balance	Clean debris, re-balance or replace fan
	Fan shifted within housing	Reposition fan
	Loose drive belt	Tighten drive belt
	Loose bolts	Tighten bolts
	Fan blades worn or broken	Replace fan
	Loose shaft bearing bolts	Tighten bolts

5.2 Troubleshooting the Auxiliary Engine

Problem	Possible Cause	Remedy
Auxiliary Engine Will Not Start	Dead Battery	Charge or replace battery
	Bad starter solenoid	Replace solenoid
	No power to console	Find break in wire, reconnect,
		Check breaker
	No power to engine	Check plug at front of auxiliary engine connecting the engine wiring harness to main sweeper harness
	No power to shutdown solenoid	Check engine module wiring
	No fuel	Fill fuel system
	Improper starting procedure	Review Section 4 - Operations
	Loose battery connector	Tighten connector
Any Additional Symptoms		Please see the John Deere manual

5.2 Troubleshooting the Water System

Problem	Possible Cause	Remedy
No Water Exiting Pump	Out of water	Refill tank
	Suction line clogged	Clean 'Y' strainer
	Air leak in line	Tighten plumbing
	Pump shaft not turning	Check motor and electrical circuit
One Spray Nozzle Not Working	Clogged strainer at nozzle	Clean or replace nozzle strainer
	Crimped or clogged water line	Un-crimp or unclog line
	Nozzle valve not on	Switch nozzle valve on
Only One Spray Nozzle Working	Clogged stainer at nozzle	Clean 'Y' and then clean or replace nozzle strainer
	No water	Refill water system
	Wiring on solenoid	Check power wire and ground, repair as needed
	Bad solenoid	Replace solenoid
Low Pressure	Worn nozzle	Replace with nozzle of proper size
	Air leak in inlet plumbing	Disassemble, reseal and reassemble
	Relief setting too low	Adjust relief valve on pump.
Water Draining From Nozzle When Off	Leaking valve	Clean valve
Any Additional Symptoms		Please see the water pump manual

5.3 Troubleshooting the Hydraulic System

Problem	Possible Cause	Remedy
Extreme Heat, Unusual Noise, or Poor Performance From The Pump	Reservoir cap is not vented	Replace cap with vented equivalent
	Dirty Hydraulic oil	Remove filters and clean or replace; change oil
	Low oil level	Check oil and fill as needed.
	Bad pump	Repair or replace pump
	Bad hydraulic motor	Rebuild or replace motor
Hydraulic System Will Not Operate	Mechanical pump not being powered	Engine must be operating; determine reason pump is not being driven and repair accordingly
	Directional valve faulty or has poor ground	Check electrical components or replace valve
	Major leak in hydraulic system	Repair leak
	Hydraulic pump pressure too low	Adjust pump pressure (relief valve in manifold)
	Leaking cylinders seals	Replace seals or seek service
Dump System Doesn't Start Function Properly	One arm tries to get ahead of the other	Bleed entrapped air from the front and rear lift cylinders when hopper and tilt is seated down. Adjust counterbalance valves on lift cylinders to match pressure setting shown on schematic.
	Dump door does not open evenly	Adjust counterbalance valves on door cylinders to match pressure settings shown on schematic.
Hopper Will Not Raise	Too much weight in hopper	Low dump hopper
	Sweeper not on a safe incline (larger than 5°)	Move to a safe level location. Or low dump hopper.

NOTE Adjust the pressure setting (release pressure) on counterbalance valves.

IMPORTANT Clockwise reduces pressure setting. Counterclockwise increases pressure setting. The two relief valve cartridges in the dump sequencing manifold must be balanced at 2750 psi setting.

5.4 Troubleshooting the Side Brooms

Problem	Possible Cause	Remedy
Broom Disc Spins too Slow	Sweeper engine speed too low	Increase sweeper engine speed to speed up broom (see section 4 - Operations)
	Fluid viscosity is too high for operating temperature	Replace with lighter weight oil
	Outside temperature too low	Run auxiliary engine longer before use
	Broom hydraulic motor is bad	Rebuild or replace motor
	Too much down pressure	Adjust down pressure
Broom Hits Frame	Inner broom cylinder stroke is too short	Screw rod end toward cylinder to lengthen stroke
	Spring tension too light	Adjust spring tension
Debris Trails Between Broom Disc & Pickup Head	Improper broom head adjustment	Adjust broom head tilt
	Broom arm with GEO extended too far	Adjust GEO
	Broom bristles worn	Replace broom bristles
Broom Disc Stalls in Heavy Debris	Pressure to broom motor too low	Adjust relief pressure
	Sweeper engine speed too low	Increase sweeper engine speed to speed up broom (see section 4 - Operations)
	Motor or pump seal leaking	Seek service
	Too much down pressure	Adjust down pressure (see section 4 - Operations)
Broom Flings Debris Back Into Gutter	Broom disc tilt angle adjusted too flat	Adjust broom disc tilt angle
Broom Flings Debris Across Street	Tilt angle of broom head too great	Adjust broom head
	Center flap worn or damaged	Replace flap
Broom Spins But Will Not Extend/Retract	The inside of the cylinder's hydraulic hose or fitting is blocked	Clear blockage
	Directional valve malfunctioning	Check directional valve. Replace if needed.
	Lock valve not functioning	Clean or replace valve
Broom Operates But Will Not Lift	Switch or directional valve wire loose or bad connection	Check wiring.
	Block solenoid valve	Replace valve
	Leaking cylinder seals (fluid loss out of port)	Replace seals
	Mechanical bind	Check broom hardware for binds
Broom Spins But Will Not Lower	Solenoid valve's electrical circuit incomplete	Complete circuit
	Bad solenoid valve cartridge (Lock Valve)	Replace cartridge
	Mechanical bind	Check broom hardware for binds
Broom Raises But Leaks Down Immediately	Solenoid valve stuck open (Lock Valve)	Clean valve or replace
	Leaking cylinder seals (fluid loss out of port vent)	Replace seals
Broom Operates But Disc Does Not Spin	Bad broom motor	Service or replace motor

	Directional valve not operating	Repair or replace directional valve
Broom Drops But Will Not Otherwise Operate	Directional valve's electrical circuits incomplete	Complete circuit
	Directional valve ports blocked	Seek service
	Bad pump or motor	Service or replace pimp or motor

5.5 Troubleshooting the Camera System

For camera system troubleshooting, see the camera system manufacturer's Owner's Manual, which is provided with the A8's sweeper manual set.

5.6 Troubleshooting the Automatic Shutdown System

For troubleshooting the automatic shutdown system, see the John Deere Manual

Section 6 - Service

Servicing your Schwarze sweeper

In this part of the manual we include checking, adjustment and/or replacement procedures for all major sweep systems and devices

For some systems and components maintenance is regular and ongoing. For others, we include a beginning statement to tell you when adjustment or replacement is necessary.

For many components, we also include a table of maintenance tasks.

DANGER Never operate, or perform maintenance to, the sweeper while wearing loose fitting clothing. Entanglement of loose clothing with the rotating elements can result in serious injury or death. Stay clear of all rotating elements at all times.

WARNING Always turn on all safety lights and flashers when servicing the sweeper.

6

In this Section

Oil Levels and Lubrication

Pickup Head Adjustment & Replacement

Hopper Replacement & Installation

Side Brooms Adjustments & Replacement

Servicing the Power Module

Dust Suppression System Cleaning & Winterizing

Electrical System Maintenance

6.1 Oil Levels and Lubrication

6.1.1 Auxiliary Engine Oil

Refer to your auxiliary engine Owner's Manual for the manufacturer's suggested oil type and oil change schedule. To drain the engine oil pan, use the engine oil drain hose. This hose, which resembles the hydraulic hoses, runs from the center of the oil pan, out the right side of the engine skid and is usually looped around to the front of the engine skid for storage. By unscrewing and removing the JIC plug in the end of the hose, the oil may be drained into a container. Be sure to dispose of the used oil properly, recycling it if possible.

6.1.2 Auxiliary Engine Cooling System

Refer to your auxiliary engine Owner's Manual for cooling system care and maintenance. When replacing your engine's coolant, be sure to dispose of the old coolant properly.

6.1.3 Hydraulic System

The hydraulic oil level should be maintained such that it is kept at the full mark as measured with the hopper down. Check by using the sight level gauge, which is located on the left side of the reservoir. Change the hydraulic oil and filter after the first 500 hours of operation, then every 2000 hours thereafter.

If the hydraulic fluid becomes cloudy, water has contaminated the system and the hydraulic fluid needs to be changed (after determining the source of the water contamination and correcting it). If the sweeping unit is operated in particularly dusty conditions, the hydraulic filters will need to be changed more often.

6.1.4 Lubrication Schedule

Item	Frequency	Lubrication
Dump Door Hinges	Monthly	Grease with lithium-based grease.
Hopper/Frame Hinge	Monthly	Grease with lithium-based grease.
Side Broom Arm U-Joint	120 Hours of Operation	Grease with lithium-based grease.
Fan Shaft Bearings	250 Hours of Operation	Grease with lithium-based grease, one pump from a hand-operated gun. DO NOT OVER-GREASE OR USE A POWER GUN

Item	Frequency	Lubrication
Fan Seal, Intake Seal, and Rear Door Seal	As Required	Lubricate with a rubber protector or grease to prevent drying and loss of resilience.

6.1.5 Fan Shaft Bearing Lubrication

The two pre-lubricated bearings on the fan shaft should be re-lubricated after 250 hours of operation (check the sweeper engine's hour meter and the lubrication chart). Use a lithium-based grease conforming to NLGI Number 2 consistency. It must be free from chemical impurities such as free acid and free alkali, as well as physical impurities such as dust, rust, metal and other abrasive particles. This light-viscosity, low-torque grease is selected because of its water-insoluble rust inhibitors and operating temperatures that make it chemically and mechanically stable. Its normal operating temperature range of -30° to +200° Fahrenheit is ideal for sweeper operations. However, it can operate intermittently at temperatures of up to +250° Fahrenheit, providing maximum bearing protection.

Always use a hand-operated grease gun to grease the bearing. Use only one pump of grease or until a small bead forms around the bearing seal. This bead acts as an indicator of adequate lubrication and provides a protective seal which prevents foreign material from entering the bearing where it would damage the races. There is generally a slight rise in operating temperature (10-30° Fahrenheit) after re-lubricating the bearing. This temperature rise will continue until the grease stabilizes in the bearing chamber.

Lubrication

1. Prior to lubricating, run the auxiliary engine in order to heat up the old grease. When the bearing grease has warmed, turn the auxiliary engine off and remove the keys.

2. Using a hand-operated grease gun, slowly apply one pump of grease to the bearing (equivalent to approximately 1/4 ounce of grease) or until a slight bead forms around the bearing seals.

IMPORTANT Never use more than one pump of grease, and do not grease the bearings more often than every 250 hours of operation. Over-greasing the bearing will cause the bearing to overheat and fail.

IMPORTANT Lubrication should never differ from the prescribed procedure or schedule. Bearing life is shortened by over-lubrication - either by greasing too frequently or too excessively.

6.2 Pickup Head

The pickup head is dependent upon forced air and vacuum to achieve debris pickup. Without proper maintenance and replacement of parts due to normal wear, the pickup head cannot provide the desired sweeping results.

6.2.1 Replacing the Skid Plate

Replace the skid plate when its runner is 80% worn through.

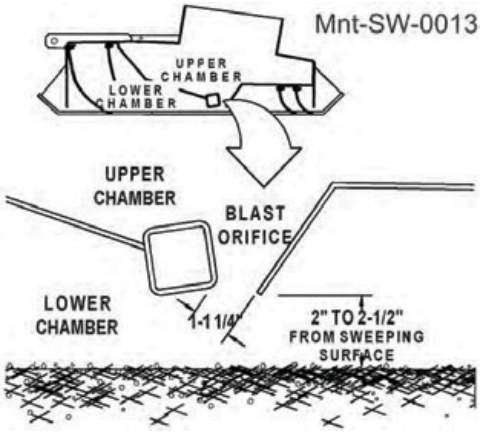
Removal/Replacement:

1. Locate the skid plates on either side of the pickup head.

NOTE Studs, welded to the pickup head, protrude through slots in the skid plates. The skid plates are held in place against the head by the nuts and washers on these studs.

2. With the pickup head raised, remove the skid plate's nuts and washers and set them aside for later use.
3. Pull the old skid from the side of the pickup head and replace it with the new skid plate.
4. Remount the nuts and washers that were removed earlier. Screw them down against the skid plate, but do not tighten them until the new skid plate is in the proper position.

When skid plate adjustment is necessary, the blast orifice must remain 2" to 2-1/2" from the sweeping surface. Less than 2", and the air stream becomes choked down. More than 2-1/2" and the blast velocity of the air striking the sweeping surface is lost.



IMPORTANT Never adjust the skid plates to extend the life of the flaps. When the flaps can no longer maintain a satisfactory seal, they should be replaced. Adjusting the skid plates instead will affect the sweeping efficiency due to the change in blast orifice-to-ground distance.

Adjustment

1. Raise the pickup head and locate the skid plates on either side.
2. Loosen the 5/8" nuts on each of the pickup head skid plates.
3. Slide each skid plate up or down its slots to achieve the required blast orifice-to-sweeping surface distance.
4. Re-tighten the 5/8" nuts on each pickup head skid plate.
5. Lower the pickup head and make sure that the skids are riding flat on the sweeping surface. Adjust as needed.

Seasonal Pickup Head Adjustments

The pickup head's orientation to the sweeping surface may be manipulated to maximize performance in various seasonal conditions.

By adjusting the leading ends of the skid plates further up than their trailing ends, the pickup head can be set to minimize frontal area. This is often preferable during heavy cleanup periods, such as in the spring cleanup season. Adjustment in this manner provides a faster channel of air/debris mixture and less distance that the debris must move.

By adjusting the trailing ends of the skid plates further up than their leading ends, the pickup head can be set to maximize frontal area. This is especially helpful during the fall season when leaves must be swept.

IMPORTANT Prolonged usage with above adjustments will require replacement of the sweeper flap replacement when re-adjustment to normal "straight" conditions.

6.2.2 Adjusting the Pickup Head Tension Spring

Near the four corners of the pickup head are the pickup head tension springs. These springs help the pickup head 'float' above the sweeping surface.

Over time these springs can lose their tension and adjustments need to be made. When skid adjustments are made, most likely the tension of the springs will also have to be adjusted.

Too little spring tension shortens runner life. Too much spring tension can cause the pickup head to bounce on irregular surfaces, resulting in loss of suction.

Fine Adjustment

1. Locate the eye bolt that connects the head spring to the frame.
2. Loosen or tighten the nut on the end of each eye bolt to raise or lower the head.

Coarse Adjustment

1. Raise the pickup head.
2. Unhook the chains from the springs or remove the 5/16" bolts that hold the spring chains to each side of the head.
3. Increase or decrease the number of chain links between the head retainers and the ends of the head springs as needed.

6.2.3 Replacing the Pickup Head

Removal

1. Raise the pickup head.
2. Unhook the chains from the springs or remove the 5/16” bolts that hold the spring chains to each side of the head.
3. Lower the pickup head and loosen the lower hose clamps on each side of the pickup head.
4. Remove the lower ends of the intake and exhaust hoses.
5. Remove the 3/8” bolts that hold the pickup head lift cylinder chains to each side of the pickup head.
6. Disconnect the water hoses that run down the drag arm from the hose barb of the first in-line spray nozzle on the pickup head, and the hose barb of the intake tube.
7. Remove the 7/8” drag arm bolts.
8. Unbolt the side brooms’ center drag flap from the front of the head.
9. Slide the pickup head out from underneath the truck.

Installation

1. Slide the pickup head underneath the truck.
2. Bolt the side brooms’ center drag flap to the front of the head.
3. Install the 7/8” drag arm bolts.
4. Connect the water hoses.
5. Install the 3/8” bolts that hold the pickup head lift cylinder chains to each side of the pickup head.
6. Connect the lower ends of the intake and exhaust hoses.
7. Fasten the lower hose clamps on each side of the pickup head and raise the pickup head.
8. Hook the chains to the springs or install the 5/16” bolts that hold the spring chains to each side of the head.

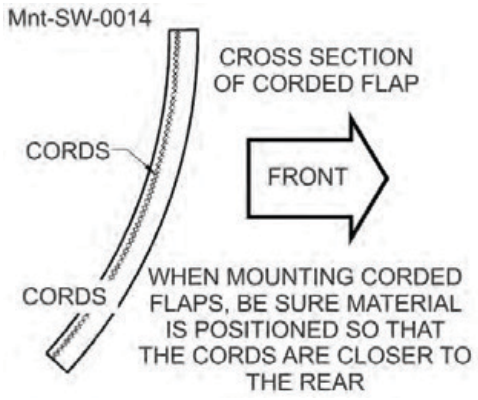
6.2.4 Replacing the Pickup Head Flaps

When new, the pickup head flaps will extend past the bottom of the skid plate. With use, these will wear until they hang straight down and lose contact with the ground. When this occurs, it is time to replace the flaps.

Replacement:

On the underside of the pickup head are four flaps of different sizes. The positioning of each flap is designed to produce the maximum performance from the pickup head. To ensure proper flap placement, replace one flap at a time.

1. Remove the pickup head by following the head removal steps of section ‘6.7.3 Pickup Head Replacement’



2. Turn the pickup head upside down.
3. Remove the 1/4” bolts which hold the metal backing strips and the flap to the pickup head.
4. Install the new flap and metal strips.

While the pickup head is upside down, also check the blast orifice for objects or blockage in the opening and clean as needed. Check the blast orifice opening for damage or deformity from impact of objects on the sweeping surface.

Even with the pickup head adjusted to the proper height, the new flaps will still hang below the bottom of the runners on the skid plates. Lower the pickup head onto a level surface and check the skid plate adjustment. If the skid plate adjustment seems correct, start the sweeper and check the head flaps for proper sealing and adequate pickup.

6.2.5 Adjusting The Pickup Head Blast Orifice

The blast orifice is set at the factory at a width of 1-1/8”. However, some operators prefer it a little wider (creating less blast force) or narrower (creating more blast force). It should be noted that too much variance from the standard 1” width will reduce sweeping efficiency.

1. Locate the two jackscrews along the rear edge of the pickup head.
2. To adjust the blast orifice width, turn the hex head of the jackscrews clockwise to open the orifice and counterclockwise to narrow it.

6.2.6 Replacing the Pickup Head Hoses

1. Unscrew the band clamps at the top and bottom of the hose to be removed. Insert a screwdriver between the hose and the housing if needed.
2. Once loose, slide off the hose, and replace it with a new one.
3. Put the band clamps back in place and tighten them.

To extend the life of the intake and exhaust hoses, periodically (3 or 4 times a year) rotate each hose.

6.3 Hopper

The hopper is a simple component and needs little in the way of maintenance. Clean the hopper daily to prevent debris build-up and follow the lubrication schedules.

6.3.1 Replacing the Hopper Seals

It is important that the sweeper's seals on the fan housing be kept in the best condition possible. These include the seals on the suction hose inlet, around the hopper's inspection door opening and on the rear door. Pickup power is vacuum dependent, so a tight seal can make a significant difference in pickup ability. Maintain resilience by keeping the seals well lubricated with a good grade of petroleum-based jelly or grease.

Lubrication of the side inspection door seals is not necessary.

For longer seal life, when the sweeper is parked for an extended period of time, leave the dump and all inspection doors open and raise the hopper a few inches so their seals can regain their shape.

Eventually the seals will become worn or non-resilient and must be replaced.

Replacement

1. Use a gasket scraper, putty knife or screwdriver to remove the seal from its sweeper component. Get the metal surface as clean as possible. Be sure it is free of all dirt, old glue, and seal material.
2. Liberally apply a coat of weather-strip-type adhesive onto the new seal and body component. Allow the adhesive to set up for several minutes (follow the adhesive manufacturer's instructions) and then put the new seal in place.

6.3.2 Replacing the Hopper

Needed for a hopper replacement:

- Two workers
- Overhead crane
- Support blocks

Removal

To remove the hopper.

1. Lower the hopper door and remove the access cover located on the hopper floor center adjacent to the hopper dump door hinge.
2. Raise the hopper just above the cab line inches and place blocks in the scissors lift slides to support the scissors lift.
3. Lower the hopper onto the support blocks.

Disassembly

1. Label hoses, electrical wiring, and hydraulic connections.

2. Remove the pins holding each lower end of the hopper dump cylinder. Tie the base end of the cylinder securely to the upper portion of the hopper on each side.
3. Position the overhead crane above the hopper center, install the hopper lifting eyes on all four corners, attaching slings or spreader bars to the lifting eyes.
4. Unscrew the retaining bolts in the front end of the hinge pins and remove the retaining pins with a slide hammer.
5. Use the crane to lift the hopper clear and set to the side.

Replacement

1. Reverse the above order to re-install the hopper.
2. Lift the replacement hopper into position aligning the hopper pivot eyes. Drive the hinge pins back into place through the hopper and the top of scissors frame.
3. Replace the original bolts and retaining washers in the ends of the hinge pins.
4. Reconnect the hydraulic hoses and electrical connections under the access plate and install access cover.
5. Swing the tilt cylinders into position and reconnect the cylinders to the hopper with pins.
6. Unchain the hopper from the crane and move to the side.
7. Start the auxiliary engine and lift the hopper so the safety props on the frame can be removed.
8. Lubricate the grease fittings on the cylinders and hinges.

NOTE: If your unit is equipped with the optional Auto Lube System, actuate the system to assure the lubrication points have received lubrication prior to the timer setting.

6.4 Side Broom(s)

The following sections deal with adjustments and replacement of mechanical portions of the side broom.

6.4.1 Adjusting the Manual Side Broom Tilt

If the side broom is not throwing debris into the pickup head path correctly, the broom pattern can be improved by adjusting one or both axis (the side-to-side and forward/rearward tilt) of the side broom.

Forward / Rearward Tilt

Forward/rearward tilt is controlled by a turnbuckle running between the broom arm mounting bracket and the top of the broom motor mount This turnbuckle must be adjusted manually.

Adjustment:

⚠ CAUTION Never work on or near the side broom when the side broom is rotating.

1. With the auxiliary engine stopped, turn the auxiliary engine key switch to ON, but do NOT start the engine.
2. Toggle the side broom cab console control switch on.
3. Locate the large turnbuckle located between the side broom mounting bracket and the side broom motor mount.
4. Loosen the jam nut on the turnbuckle.
5. Insert a large screwdriver or wrench into the center of the turnbuckle to use as leverage.
6. To lower the nose of the side broom disc, lengthen the turnbuckle by turning the center clockwise.
7. To raise the nose of the side broom disc, shorten the turnbuckle by turning the center counterclockwise.
8. Run the jam nuts tight against the turnbuckle to lock the readjustment.

Side-To-Side Tilt

NOTE If the sweeper has the optional cab-switched side broom tilt option installed, you can skip this section and adjust the side-to-side tilt from within the cab.

Side-to-side tilt is controlled by the broom arm's small turnbuckle running between the pivot (connecting the broom arm to one side of the broom motor mount) and the rear of the broom arm. This turnbuckle must be adjusted manually.

Adjustment:

⚠ CAUTION Never work on or near the side broom when the side broom is rotating.

1. Start the auxiliary engine.
2. Run the side broom to its extended sweeping position.
3. Stop the side broom disc rotation.
4. Locate the small turnbuckle located in the side broom arm.
5. Loosen the jam nut on the turnbuckle.
6. Insert a large screw driver or wrench into the center of the turnbuckle to use as leverage.
7. To increase the tilt of the side broom disc, lengthen the turnbuckle by turning the center clockwise.

8. To decrease the tilt of the side broom disc, shorten the turnbuckle by turning the center counterclockwise.
9. Run the jam nuts tight against the turnbuckle to lock the readjustment.

6.4.2 Adjusting the Manual Side Broom To Pavement Contact/Down-Pressure

NOTE If the sweeper has the optional cab-switched side broom down pressure option installed, you can skip this section and adjust the down pressure from within the cab.

Optimum down-pressure ensures good sweeping performance. Lighter debris may require less down-pressure; heavier material, such as soil or millings, may require more digging pressure from the broom.

Adjustment

⚠ CAUTION Never work on or near the side broom when the side broom is rotating.

1. With the broom in the up position, locate the nut holding the eyebolt to the motor-mount angle bracket.
2. Thread the nut all the way out to the end of the eyebolt.
3. Remove or add chain links as desired between the eyebolt and spring.
4. Screw the eyebolt nut about 1-1/2 inches up the eyebolt.
5. Start the auxiliary engine.
6. Lower and run the side broom.
7. As the broom runs, observe the bend in the broom bristles to determine whether down-pressure should be increased or decreased.
8. Stop the broom.
9. Turn the auxiliary engine OFF.
10. If down-pressure should be INCREASED, loosen the eyebolt nut by threading it further down the eyebolt.
11. If down-pressure should be DECREASED, tighten the eyebolt nut by threading it further up the eyebolt.

6.4.3 Adjusting the Side Broom Extension Spring

The side broom extension spring controls the side broom arm extension speed and travel. Located to the outside of the side broom arm, this spring is connected to the side broom mounting bracket by a chain at one end. The spring's other end is attached to a large eyebolt fastened to the side broom motor mount. To start a sweeping operation, the extension spring extends the broom to its working position. When the broom is retracted, however, the tightening spring works in combination with the upward and inward pull of the cylinder to raise the side broom arm off the sweeping surface.

The side broom extension spring may need adjustment when:

- • The broom doesn't fully extend during operation
- • Travel speed is too slow

You control the side broom arm extension speed and travel by adjusting:

- • Extension spring tension
- • Attitude of the chain

Adjustment:

⚠ CAUTION Never work on or near the side broom when the side broom is rotating.

1. With the broom in the up position, locate the extension spring.
2. Locate the row of slots in the side broom mounting bracket's outer plate.
3. To DECREASE chain attitude, move the chain to a slot closer to the outer plate.
4. To INCREASE chain attitude, move the chain to a slot further away from the outer plate.
5. To INCREASE tension, remove links from the chain and/or adjust the eyebolt on the side broom motor mount.
6. To DECREASE tension, add links to the chain and/or adjust the eyebolt on the side broom motor mount.

6.4.4 Adjusting the Side Broom Hydraulics

The only hydraulic adjustment that may be necessary concerns return speed. Return speed is controlled by a flow control cartridge valve on a small valve block, fastened to the main valve.

You open or close this flow control cartridge valve to adjust hydraulic return speed, turning it clockwise to slow the return speed and counterclockwise to increase the return speed.

Side broom hydraulic speed may need adjustment when the side broom:

- Does not retract.
- Retracts too fast.
- Retracts too slowly.

Adjustment:

⚠ CAUTION Never work on or near the side broom when the side broom is rotating.

1. Start the sweeper and run the side broom for about 5 minutes.
2. Check the sight gauge on the hydraulic tank.
3. Continue to run the side brooms until the hydraulic-fluid temperature has reached 80° degrees
4. Turn off the sweeper and the side broom.
5. Locate the flow control cartridge valve on the small valve block fastened to the side broom mounting bracket. The flow control cartridge valve protrudes from the bottom of the valve block.
6. Loosen the jam nut that secures the stem of the flow control cartridge valve.
7. Restart the sweeper and broom.
8. Run the broom at normal RPM.
9. Observe the return speed as you lower and raise the side broom. The return speed should be between 1-1/2 and 3 seconds.

⚠ CAUTION Never adjust the flow control cartridge valve when the side broom is turning. Always stop the side broom before attempting to adjust the control flow cartridge valve.

10. Turn off the broom
11. If the return speed was too slow, increase the flow by inserting an Allen wrench into the end if the valve's stem and turning counterclockwise.
12. When return speed is between 1-1/2 and 3 seconds, run the jam nut back against the valve's main body to secure the valve stem in place.

6.4.5 Adjusting/Replacing the Side Broom Cylinder

Adjustment

⚠ CAUTION Never work on or near the side broom when the side broom is rotating.

1. With the auxiliary engine stopped, turn the auxiliary engine key switch to ON, but do NOT start the engine.

2. Turn on the side broom.
3. When the side broom is extended to its normal operating position, turn it off.
4. Locate the rod end on the cylinder's extension rod.
5. Screw the jam nut away from the cylinder's rod end.
6. Grasp the painted portion of the rod with a pair of channel-lock pliers.
7. To increase the inward and upward distance the side broom will travel when retracted, adjust the rod end to shorten the cylinder.
8. To decrease the inward and upward distance the side broom will travel when retracted, adjust the rod end to lengthen the cylinder.
9. Run the jam nut tight against the cylinder's rod end to lock the readjustment.

Replacement:

1. Start the auxiliary engine and run the side broom.
2. When the side broom is extended to its normal operating position, turn it off.
3. Turn the auxiliary engine key switch back ON, but do NOT start the engine.
4. Move the side broom control switch up and down several times. Doing so relieves any back pressure in the cylinder, making removal easier.
5. Disconnect the hydraulic hose from the cylinder.
6. Remove and set aside hydraulic fittings from the cylinder ports.
7. Remove the bolt at the rod end of the cylinder and set it aside.
8. Remove the bolt at the base of the cylinder and set it aside.
9. Pull the cylinder from the broom arm.
10. Unscrew the rod end and jam nuts from the cylinder to be replaced.
11. Attach the rod end and jam nuts just removed to the new cylinder.
12. Position the new cylinder on the broom and bolt it into place.
13. Taking care to place the vented plug in the butt-end port, attach the previously set aside hydraulic fitting to the new cylinder.
14. Reattach the hose to the rod and fitting.

6.4.6 Replacing the Side Broom Motor

⚠ CAUTION Never perform service on the side broom motor while the auxiliary engine is on.

Disassembly

1. With the side broom in the raised position, remove a side broom segment
2. Reaching under the side broom, loosen the large nut at the end of the side broom motor shaft until the gap between the nut and the shaft is about 1/4 inch.
3. Insert a pry bar between the side broom motor mount and the side broom disc, and pry the disc from the motor mount. Tap on the side broom disc with a hammer if needed.
4. Position a floor jack under the side broom disc to raise the disc above the side broom motor shaft nut.
5. Remove the side broom motor shaft nut
6. Let down the jack.
7. Remove the side broom disc from the side broom motor shaft
8. Label which hydraulic hose is attached to which side broom-motor port.
9. Remove the two side broom motor hoses
10. Remove the four side broom motor mounting bolts
11. Remove the old side broom motor.
12. Remove hydraulic fittings from the old side broom motor

Replacement

1. Install the new side broom motor onto the side broom motor mount.
2. Attach the previously labeled hydraulic hoses to the correct labeled ports and reconnect hydraulic fittings.
3. Use the floor jack to raise the side broom disc while positioning it under the side broom motor.
4. Locate the key in the keyway of the motor shaft.
5. Raise the side broom disc into position, aligning the key with the broom disc keyway.
6. When the side broom disc is in correct position, screw the side broom motor shaft nut onto the end of the shaft.
7. Tighten the side broom motor shaft nut.
8. Replace the missing side broom segment.
9. Turn the auxiliary engine ON.
10. Turn the side broom ON.
11. Check the side broom pattern and adjust as needed.

6.4.7 Replacing the Side Broom Tilt Cylinder

⚠ CAUTION Never work on or near the side broom when the side broom is rotating.

Disassembly

1. Start the auxiliary engine and turn on the side broom.
2. When the side broom is lowered, turn it off.
3. Locate the cylinder bolted to the pivot.
4. Remove the two bolts at either end of the cylinder. It may be necessary to manually wiggle the broom disc to rock the pivot so you can work the bolt loose

5. Disconnect the two hoses from the cylinder.

Replacement

1. Connect the two hoses to the replacement cylinder.
2. Use the two bolts to install the replacement cylinder.

6.4.8 Replacing the Side Broom Bristles

Side broom bristles should be replaced when they are worn to approximately 6 inches in length. When side broom bristles are allowed to wear shorter, the bristles become too stiff and loose their ability to flick debris.

⚠ CAUTION Never work on or near the side broom when the side broom is rotating.

1. With the side broom in the raised position, locate the most accessible side broom bristle segments.
2. Remove the bolts that hold the first side broom bristle segment to the side broom disc.
3. Position the new side broom bristle segment and replace the bolts holding it to the side broom disc.
4. Repeat steps 2 and 3 for other accessible side broom bristle segments.
5. Start the auxiliary engine.
6. Run the side broom until other side broom bristle segments are accessible for replacement.
7. Turn off the auxiliary engine.
8. Repeat steps 2 through 6 to expose and replace all side broom bristle segments.

6.5 Power Module

Because of the nature and operation of a sweeping machine, it is recommended that servicing of the filters, changing oil and other routine preventive maintenance functions be performed somewhat more frequently than recommended by the manufacturer of the engine.

Auxiliary Engine Filters

The auxiliary engine has three filters: a fuel filter, an oil filter and a dual element air filter. At a minimum, all filters should be changed according to the engine manufacturer's warranty recommendations. We recommend that the oil filter be changed more often if the sweeper is operated under unusually dusty circumstances.

The air filter has a built-in air restriction indicator. When the air filter becomes clogged and needs service, a window on the air restriction indicator changes color. Depending upon the type of air restriction indicator used, this color change may be from clear to red, clear to yellow or yellow to red. The air restriction indicator is normally located on or near the auxiliary engine's air filter canister or optionally by remote in the truck cab on the console.

IMPORTANT Do not clean air filter with high pressure air. Clean or change the air filter only when the air restriction indictor's 'Need to Service' window has changed colors. Serious engine damage can occur as a result of air cleaner overservicing.

For air filter change and service information, please see the Owner's Manual for the auxiliary engine.

6.5.1 Replacing the Engine Stub Shaft

Stub shaft failures are rare but may, at some point, need to be replaced. Causes for stub shaft failure include; too much side-load created by a too tight drive belt, grooving or warping of the stub shaft by a failed bearing and stub shaft cracking or warping due to torque created by the sudden stop of the fan's drive train. In addition, we suggest that the stub shaft be replaced whenever the auxiliary engine is changed.

Replacement

1. Remove the sweeper engine's keys and/or disconnect the battery cable to prevent the sweeper engine from being started accidentally.
2. Follow the procedures outlined in steps 1 - 4 in section '6.6.2 Drive Belt Tension Adjustment'.
3. Turn the jackscrew nuts so the engine skid is pushed toward the fan shaft.

4. As the engine skid moves toward the fan shaft, the drive belt will become loose enough to be slipped from its pulleys.
5. Remove the three 3/8” bolts and lockwashers from the stub shaft pulley bushing.
6. Insert two of the 3/8” bolts into the two tapped holes of the stub shaft pulley bushing.
7. Tighten the bolts evenly, alternating from one to the other. This will push the pulley off the stub shaft pulley bushing.
8. Remove the pulley and its bushing from the stub shaft.
9. Remove the bearing plate from the end of the auxiliary engine bell housing. Inspect the plate for irregularities. If none are found, the bearing plate may be used again.
10. Remove the old stub shaft from the end of the auxiliary engine.
11. Clean the flywheel and replacement stub shaft using lacquer thinner.
12. Fasten the replacement stub shaft to the auxiliary engine using 60 ft. lbs. of torque on each bolt.
13. Use a dial indicator and ensure that the stub shaft is in-line with the crankshaft. The stub shaft must be no more than .008” off-center.

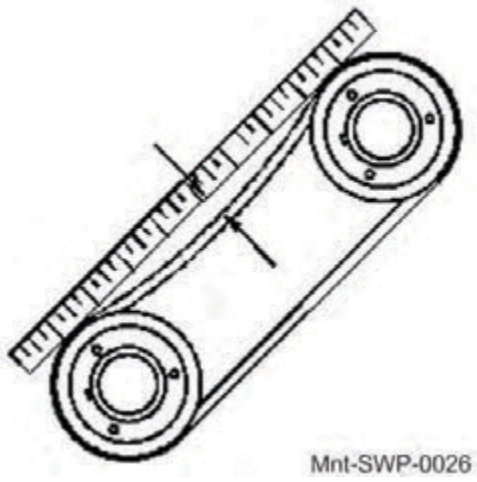
IMPORTANT If the stub is more than .008” off-center, it should be replaced.

14. Place the replacement bearing onto the end of the shaft. Using a piece of pipe placed over the stub shaft’s end, drive the bearing down the stub shaft until it rests against its seat.
15. Slip the bearing plate down the stub shaft and onto the bearing.
16. Bolt the bearing plate too the auxiliary engine.
17. Slide the stub shaft pulley and its taper-lock bushing onto the end of the stub shaft.
18. Insert the bolts through the taper-lock bushing onto the end of the stub shaft.
19. Check the alignment of the pulleys, using a string or straight edge, from the face of one pulley to the face of the other to determine whether the pulleys are in line with each other.
20. If the pulleys are misaligned, back the stub shaft pulley off its bushing, move both in the proper direction for alignment, them retighten the bushing/pulley bolts.
21. Inspect the drive belt for wear and replace it with a new one if needed.
22. Slide the drive belt onto the stub shaft and fan shaft pulleys.
23. Adjust the drive belt tension as outlined in Section, ‘6.6.2 Drive Belt Tension Adjustment’

24. Replace the belt guard.

6.5.2 Adjusting the Drive Belt Tension

The drive belt is a belt that drives the fan shaft. Check the belt tension periodically. This is accomplished by pressing down on the belt halfway between the two pulleys. With 50- 75 lbs. of pressure (the approximate equivalent of very firm pressure from on it from your thumb), the belt should deflect about 1/4" - 3/8". An average belt, over the course of its life, will stretch slightly and the belt will need adjustment. This will be especially true during the first 50-75 hours of operation.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Adjustment

The auxiliary engine, along with its engine skid, can be moved in the direction of the fan shaft (to loosen or remove the belt) or away from the fan shaft (to tighten the belt).

1. Remove the belt guard.
2. Loosen (but do not remove) the bolt which holds each of the four outer corners of the engine skid to the top of the power module platform.
3. Locate the threaded rods known as jackscrews.

IMPORTANT Before adjusting the jackscrews, mark the present position of the engine skid, both at the front and rear, on the power module platform. This will allow you to determine how far the engine skid has been moved and whether the center line of the auxiliary engine is still parallel with the fan shaft.

4. Loosen the jackscrews' jam nuts.
5. By running the adjustment nuts in or out, the engine skid may be moved toward or away from the shaft. Alternate adjusting the jackscrew nuts front to rear so that movement of the engine skid is even and the engine skid does not become misaligned. If you turn the front jackscrew three revolutions, then turn the rear jackscrew three revolutions.
6. When proper belt tension is achieved, re-thread the loose adjustment nuts tightly against their power module platform tabs. (If you're adjusting the engine away from the fan shaft, these would be the inner adjustment nuts; toward the fan shaft, these would be the outer adjustment nuts.) Tighten any loose jam nuts back against their respective adjustment nuts.
7. Tighten the four tie-down bolts at the corners of the engine skid.
8. Start the sweeper engine. Squealing or abnormal vibrations indicate low belt drive tension. Adjust as needed.

9. Re-bolt the belt guard back into position.

6.5.3 Replacing the Drive Belt

Replace the drive belt when it shows signs of wear, rather than waiting for it to break. This practice will help to ensure optimum sweeper performance and avoid downtime.

To replace the drive belt, reposition the sweeper engine. This can be accomplished by loosening the mounting bolts and jackscrews attached to the engine skid, as described in the section '6.5.1 Drive Belt Tension Adjustment' of this manual.

Be sure to read the section '6.5.1 Drive Belt Tension Adjustment' of this manual before proceeding.

Before installing a new drive belt, always inspect the belt pulleys for nicks, burrs or excessive wear. Replace the pulleys if such irregularities are found.

Removal:

1. Remove the sweeper engine's keys and/or disconnect the battery cable to prevent the sweeper engine from being started accidentally.
2. Follow the procedures outlined in steps 1-4 in section '6.5.1 Drive Belt Tension Adjustment' of this manual
3. Turn the jackscrew nuts so the engine skid is pushed toward the fan shaft.
4. As the engine skid moves toward the fan shaft, the drive belt will become loose enough to be slipped from its pulleys.

Replacement

1. Inspect the pulley grooves for burrs and other irregularities that may cause abnormal belt wear. Correct as required.
2. Slip the replacement belt into position.
3. Tighten the jackscrew nuts so the engine skid is pulled away from the fan shaft.
4. Continue to tighten until the belt has 1/2" deflection between the pulleys using 30 lbs. of pressure (roughly the equivalent of pressing down on the belt with your thumb).
5. Check the alignment of the pulleys, using a string or straight edge, from the face of one pulley to the face of the other. This will allow you to determine whether the pulleys are in line with each other.

IMPORTANT For slight misalignment, the pulleys may be repositioned on their respective shafts. If greater adjustment is needed than pulley repositioning can achieve, the entire engine/engine skid assembly must be moved to obtain alignment. The slotted tie-down holes of the engine skid allow a limited amount of forward & back movement.

6. Once proper pulley alignment is achieved, run the jam nuts back against their respective jackscrew nuts.
7. Tighten the four tie-down bolts at the corners of the engine skid.
8. Start the sweeper engine. Squealing or abnormal vibrations indicate low belt drive tension. Adjust as needed.
9. Re-bolt the belt guard back into position.

6.5.4 Replacing the Fan Shaft Bearing

With proper lubrication, and under normal operating conditions, the bearings should last approximately 2500 hours (check the auxiliary engine's hour meter). Premature bearing failure is often due to improper lubrication procedures.

Bearing failure is accompanied by abnormal noise, vibration and/or the slinging of grease caused by ruptured bearing seals. Worn bearings should be replaced immediately to prevent damage to other sweeper components. The severing of the fan shaft, during the fan shaft bearing removal procedures necessitates a replacement fan shaft. Usually, accompanying drive belts, pulleys and bushings are also replaced. This ensures proper performance and eliminates repetitive maintenance and downtime.

Disassembly:

1. Raise the hopper and lower the safety prop into position. (203Nm). Use only the correct flail bolt and locking nut. Check the flail pivot bushings for possible damage or wear. They do not require oil.
2. Remove the sweeper engine's keys and/or disconnect the battery cable to prevent the sweeper engine from being started accidentally.
3. Remove the 3/8" bolts and flat washers from around the fan housing back plate.
4. Pull the back plate free from the fan housing.
5. Remove the three 3/8" bolts and lockwashers from the fan bushing.
6. Insert two of the 3/8" bolts into the two tapped holes of the fan bushing.
7. Tighten the bolts evenly, alternating from one to the other, This will push the fan off the fan bushing.

8. Use a gear puller to remove the fan bushing from the fan shaft. The fan shaft key will come off with the bushing.
9. Slide the fan off the fan shaft.
10. Relieve the drive belt tension.
11. Unbolt the drive pulley from its taper-lock bushing. Remove both from the end of the fan shaft.
12. Loosen the bearings' lock collars and slide them away from the bearings.
13. Clean the fan shaft between the two bearings with an emery cloth to remove any dirt or rust.
14. Thoroughly spray the fan shaft between the bearings with WD-40 lubricant.
15. Unbolt the rear bearing and slide forward along the fan shaft. And save the bearing spacers, and lock collars for reuse on the replacement fan shaft and bearings.
16. If the rear bearing is able to be slid forward along the fan shaft, unbolt the front bearing, slide the fan shaft with bearings rearward until the front end of the fan shaft clears the front power module upright, and remove the fan shaft assembly and proceed to the following section, 'Replacement'. If the rear bearing cannot be moved, re-bolt the rear bearing in place and proceed to step 17.

⚠ DANGER Before cutting the fan shaft, be sure the fuel tank's cap is closed and the tank is protected by a welder's leather cover. Never let the flame of the torch come directly in contact with the fuel tank.

17. Using an acetylene torch, cut the fan shaft in half, between the power module uprights and as close to the front bearing as possible.
18. Unbolt the bearings from the uprights and remove the bearings and the fan shaft halves. Save the bearing spacers, lock collars for reuse on the replacement fan shaft and bearings.
19. Inspect the fan shaft drive pulley and drive belt. If either is damaged or too worn for reuse, discard and replace.

Replacement:

1. Bolt the rear bearing, along with its spacer plate on to the rear power module upright. Be sure each bolt has two washers between the upright and spacer plate and two washers between the spacer plate and bearing.
2. Bolt the front bearing into position on the front power module upright.
3. Slip the replacement fan shaft into the rear bearing through the opening in the back of the fan housing.

IMPORTANT To prevent damage to the fan shaft, place a piece of wood against the end when using a hammer to drive the fan shaft through the rear bearing.

4. Slide the fan shaft end, slowly driving the fan shaft through the rear bearing.
5. Once the fan shaft end has cleared the front of the rear bearing, slide the lock collars onto the end fan shaft.
6. Slip the fan shaft forward and into the opening of the front bearing.
7. Slide the fan shaft through the front bearing.
8. Continue inserting the fan shaft into the bearings until seven inches of the shaft are protruding into the fan housing.
9. Slip the lock collars onto their respective bearings, tightening them to lock the bearing race to the fan shaft.
10. Slide the drive pulley and its taper-lock bushing onto the end of the fan shaft.
11. Insert the bolts through the taper-lock bushing's flange and into the pulley. Alternate turning the three bolts so the pulley is pulled onto the bushing evenly.
12. Check the alignment of the pulleys, using a string or straight edge, from the face of one pulley to the face of the other to determine whether the pulleys are in line with each other.
13. If the pulleys are misaligned, back the fan shaft drive pulley off its bushing, move both in the proper direction for alignment, then retighten the bushing/pulley bolts.
14. Inspect the drive belt for wear and replace it with a new one if needed.
15. Slide the drive belt onto the engine and fan shaft pulleys.
16. Adjust the drive belt tension.
17. Inspect the fan for wear and replace it with a new one if needed.
18. Follow the steps outlined under 'Replacement' in section, 'Fan Replacement' section of this manual.
19. Swing the hopper safety prop back into its travel position.
20. Reconnect the engine's battery cable, lower the hopper and check the operation of the sweeper.

6.5.5 Inspecting the Sweeping Fan System

Over time, dust will cause wear to the fan house liner, fan house liner bolts and fan blades.

Inspection

1. Raise the hopper and lower the safety prop into position.

2. Remove the sweeper engine's keys and disconnect the battery cable to prevent the engine from starting accidentally
3. Remove the back plate.
4. Using a flashlight, inspect the fan blades, fan bushing, fan housing liner bolts and the fan housing liner for wear.
5. If no excess wear or abnormal wear is evident, replace the back plate, swing the hopper's safety prop back into its stored travel position and reconnect the battery cables.

6.5.6 Replacing the Fan House Liner

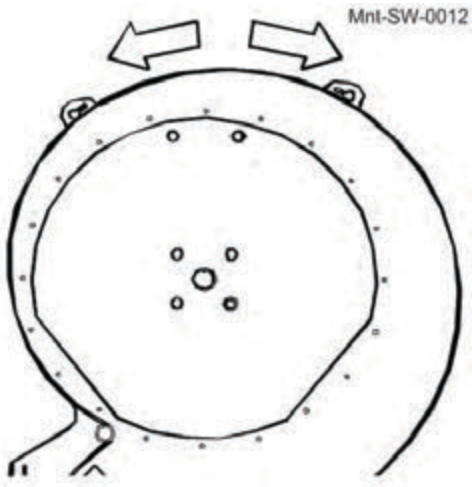
To prevent damage to the fan housing, a rubber liner is attached to the inside of the fan housing. Check the liner regularly for holes, tears or pitted areas. If the fan housing is exposed to direct wear because of a worn liner, the liner should be replaced.

Disassembly

1. Raise the hopper and lower the safety prop into position.
2. Remove the sweeper engine's keys and/or disconnect the battery cable to prevent the sweeper engine from being started accidentally.
3. Remove the 3/8" bolts and washers from around the back cover plate and lift it off.
4. Remove the 3/8" bolts and lock washers from the fan's bushing.
5. Reinsert two 3/8" bolts into the tapped holes of the bushing. Tighten these bolts evenly. This will push the fan off the bushing.
6. Use a gear puller to remove the bushing from the fan shaft.
7. Remove the fan from the fan shaft and fan housing.
8. Unscrew the 3/8" nuts from around the outside of the fan housing and remove the elevator bolts holding the rubber liner in place. Note the condition of the fan housing liner bolts. Worn bolts should be discarded and replacements used upon re-installation.
9. Remove the worn liner.

Replacement:

1. Notice that the replacement liner hole pattern is different at each end. Be sure to position the liner so that the holes match the hole pattern of the fan housing.
2. Start by installing the elevator bolts that hold the rubber liner to the top of the fan housing, and then continue installing the remainder of the elevator bolts, working out and down from the top of the fan housing. (see illustration)



6.5.7 Replacing the Fan System Fan

If a worn fan is causing reduced sweeping efficiency, it should be replaced promptly. The fan shaft bearings have a life expectancy of roughly 2500 hours. When a fan replacement becomes necessary near the end of the bearing's life expectancy, the bearings should likewise be replaced.

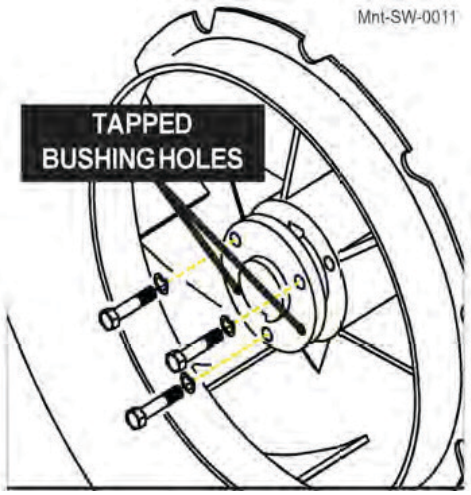
Exceptions to fan/bearing replacement:

• If you sweep in extremely sandy conditions, or do not use the sweeper's water system, you may have to replace fans more often than bearings.

• If the proper bearing lubrication procedures aren't followed, you may have to replace bearings more often than fans.

Disassembly

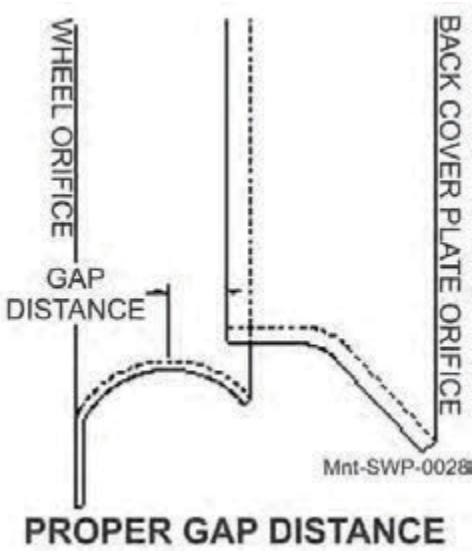
1. Raise the hopper and lower the safety prop into position.
2. Remove the sweeper engine's keys and/or disconnect the battery cable to prevent the sweeper engine from being started accidentally.
3. Remove the 3/8" bolts and washers from around the back cover plate and lift it off.
4. Remove the 3/8" bolts and lock washers from the fan's bushing.
5. Reinsert two 3/8" bolts into the tapped holes of the bushing. Tighten these bolts evenly. This will push the fan off the bushing.
6. Use a gear puller to remove the bushing from the fan shaft.
7. Remove the fan from the fan shaft and fan housing.



Replacement:

1. Inspect the end of the fan shaft. Remove any burrs or rust from the shaft end with sandpaper.
2. Place the fan on the fan shaft and push it back into the fan housing.
3. Inspect the bushing. If the bushing is not cracked or otherwise damaged, the original bushing may be reused.
4. Apply an anti-seize agent to the tapered area of the bushing.
5. Slip the key into the bushing/fan shaft key-way.
6. Position the fan bushing onto the fan shaft while aligning it with the shaft key as well as the fan. Spread the bushing apart if necessary - remember, it will crack if it is overspread.
7. Drive the fan bushing onto the fan shaft until approximately 1/4" of the shaft extends from the face of the bushing. (Use a rubber hammer or a wooden block and metal hammer to drive the bushing on.)

8. Insert the three 3/8” bolts with lock washers through the untapped bushing holes and into the tapped holes of the fan. Finger tighten the bolts. Do not tighten the bolts so as to secure the fan to the fan shaft.
9. Apply strip caulk, or a similar sealing agent, to the face of the fan housing.
10. Install the back cover plate (it may be necessary to move the fan and its bushing further into the fan housing before the back cover plate can be mounted). Before tightening the bolts, pull the fan back until it contacts the back cover plate’s inlet ring. Using the available slack, center the cover plate’s inlet ring in the fan’s orifice. Feel around the perimeter of the inlet ring to confirm an even gap or fit. Tighten the cover plate bolts.
11. Move the fan back onto the fan shaft. A gap distance will have to be determined (see illustration). The ideal gap distance is 1/4” from the cover plate orifice to the narrowest part of the fan’s orifice
12. Position the fan on the fan shaft, taking into consideration that, as the fan is tightened onto its bushing, it will travel roughly 1/4” toward the cover plate’s orifice.
13. While holding the fan in position on the fan shaft, tap the fan bushing along the fan shaft and into the fan’s hub.
14. When the fan bushing is snug inside the fan’s hub, insert the 3/8” bolts and tighten the fan onto the fan bushing. As the bolts are tightened and the fan is drawn onto the bushing, the fan should move 1/4” toward the cover plate.
15. Turn the fan to determine if the two orifices rub as the fan rotates. If the orifices touch, mark the bushing’s present position on the fan shaft (so it may later be used as a reference point). Remove the fan from its bushing and follow steps 11-15 to remount the fan further into the fan house. If the orifices do not touch, proceed on to Step 16.
16. When the fan is properly mounted, swing the hopper safety prop into its stowed position and lower the hopper. Start the auxiliary engine and, again, listen for sounds of contact between the cover plate orifice and fan orifice. If none are audible, the unit is ready to sweep. If sounds are detected, the hopper should be raised and the fan readjusted.



PROPER GAP DISTANCE

6.5.8 Hydraulic System Service Schedule

We recommend the service listed in the following table.

Service	Frequency
Check hydraulic system pressure and adjust.	As Needed

Service	Frequency
Change the hydraulic fluid and filters.	• Service records show that the new sweeper has completed its first 500 hours of operation • Thereafter, service records should show that the sweeper has been operated 2,000 hours since its last hydraulic fluid change. • If the hydraulic fluid becomes cloudy, water has contaminated the system. It should be changed and flushed.
Check hydraulic fluid level.	Daily

6.5.9 Filling the Hydraulic Tank

Filling The Tank

1. Locate the hydraulic tank on the left side of the sweeper between the power module uprights.
2. Examine the hydraulic fluid sight-level gauge located on the side of the tank. The fluid level should register at or about the high mark.
3. Locate the fill opening on top of the hydraulic tank.
4. Remove the cap.
5. Use a funnel to fill the hydraulic reservoir to the desired level with one of the following:

- Shell Tellus 68 hydraulic fluid
- Citgo 68 hydraulic fluid
- An equivalent 22-weight (SAE) fluid
- 30-weight (SAE) fluid for systems operating with an ambient fluid temperature greater than 100ºF.

6. Replace the cap

6.5.10 Draining the Hydraulic Tank Draining

Draining The Tank

1. Locate the drain hose attached to the bottom of the hydraulic tank. This drain hose exits the bottom of the tank, and is usually stored between the uprights and engine, or run down the back of the power module beside the fan house.
2. Place a 25 gallon capacity container on the ground, positioning it below the drain.
3. Remove the JIC plug from the end of the drain hose.

4. Allow all the fluid to drain.
5. Reattach the JIC plug to the end of the drain hose.

6.5.11 Replacing the Hydraulic Suction Filter/Strainer

Replacement

1. Drain the hydraulic tank following the procedures outlined in Section, 'DRAINING THE HYDRAULIC TANK.'
2. Locate the suction filter. Its large bushing-like head may be seen protruding from the suction line's tank flange located near the bottom of the hydraulic tank.
3. Remove the suction hose and its fittings from the center of the strainer.
4. Unscrew the strainer from the hydraulic tank.
5. Examine the suction strainer.
6. If the strainer is clogged, clean it with an approved cleaning solvent.
7. If the strainer is damaged, replace with an S-5 strainer.
8. Screw the cleaned or replacement strainer into the tank.
9. Re-attach the hose and its fittings to the center of the strainer.

6.5.12 Replacing the Hydraulic Return Filter

Replacement

1. Locate the return filter.
2. Unscrew the old canister from the filter head.
3. Fasten the replacement filter canister to the filter head

6.5.13 Adjusting the Hydraulic System Pressure

Only under maximum load, the hydraulic system runs at a relief hydraulic pressure of 2500 PSI. Under normal operation, hydraulic pressure runs well below this.

Hydraulic Pump Pressure Check

Before adjusting:

- Check the electric and hydraulic systems for loose connections.
- Check the hydraulic fittings and hoses for leaks.
- Check the fluid for contamination and proper fill level.

Pressure Verification:

Use a pressure gauge able to measure at least 3000PSI to check the pump's output pressure. A test nipple, is located on the pressure port fittings of the hydraulic manifold.

4. Attach a pressure gauge to the test nipple.
5. Start the auxiliary engine and throttle up to approximately 2000 RPMs.
6. Have an assistant hold the side broom switch in the 'raise' position and continue to hold the switch in this position even after the side broom is fully raised.
7. Check the pressure gauge; it should read 2500 PSI while the switch is being held. When the switch is released, the pressure gauge reading should change to about 800 PSI.
8. If the pressure gauge reading is considerably different, you may need to adjust the manifold's pressure relief valve.

Pressure Relief Valve Adjustment

1. Locate the relief valve, screwed into the face of the manifold block.
2. Turn the relief valve stem's jam nut 1/8 of a complete revolution at a time. Turn the relief valve stem clockwise to increase the fluid pressure, and counter-clockwise to decrease the pressure.

6.5.14 Checking the Directional Valve Override

In the hydraulic system, fluid flow direction is used to control the various hydraulic functions. The directional valve determines the flow direction. If the directional valve is faulty and unable to reverse the hydraulic fluid flow, the directional valve's hydraulic function will not operate properly.

Override Check:

1. Locate the directional valve attached to the manifold block of the power module.
2. Locate the solenoid and two plugs that are attached with wires at either end of the directional valve. Each plug contains a small light that illuminates whenever that solenoid is electrically activated.
3. With the auxiliary engine running, toggle the in-cab console control panel switch that controls the hydraulic function for that particular directional valve.
4. One of the two lights should illuminate, indicating power is being supplied to that side of the directional valve. If neither light operates, the directional valve is not receiving power and the problem is electrical.
5. If the directional valve lights operate when the incab console control panel switch is toggled, the problem may be within the directional valve.

6. On either end of the directional valve is a small hole, about 1/8" in diameter. With the auxiliary engine running, insert a small nail or small Phillips screwdriver to insert into the holes (one at a time) at either end of the directional valve to manually override the directional valve. There is an initial easy push of the plunger, then a greater amount of pressure must be used to overcome the spring. If this procedure corrects the hydraulic function problem, then the directional valve is faulty and should be repaired or replaced.

6.6 Dust Suppression System

For dust suppression during sweeping operations, water flows from the water reservoirs and through the 'Y' strainer and the hydraulically-driven water pump. Then, it goes through the water manifold and hoses to the spray nozzles.

Water being drawn from the water reservoir to the water pump passes through the Y strainer screen, trapping and preventing debris from reaching the rest of the dust suppression system.

We recommend the maintenance listed in the following table:

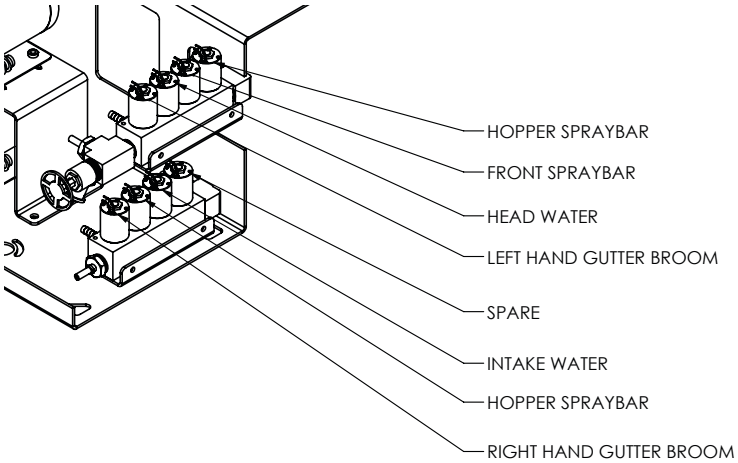
Service	Frequency
Clean the 'Y' Strainer	Daily
Inspect and clean the nozzles	Daily
Winterize the system	When Needed

6.6.1 Refilling the Water Reservoir

Replacement

1. Turn on the hydrant and allow the water to run for a short period of time so any rust and/or sediment trapped in the water line can be cleared. An uncleared water line can introduce debris to the sweeper's water system.
2. Remove the 2-1/2" hydrant hose from the storage rack and attach one end to the hydrant. Attach the other end to the pipe feeding the air-gapped fill opening of the reservoir.
3. Allow the reservoir to fill until water gushes from its overflow.

6.6.2 Cleaning the Water Manifold Solenoid



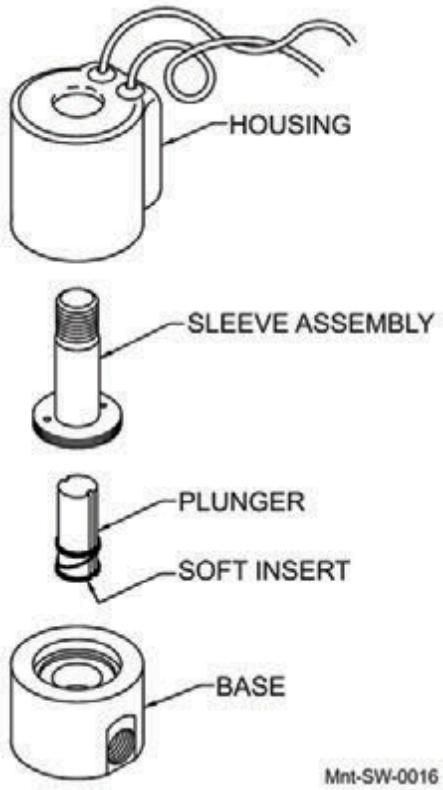
The water manifold solenoid should be cleaned when the nozzle has been cleaned or replaced and:

- Water leaks or sprays weakly from the nozzles.
- Little or no water flows from the nozzles.

IMPORTANT Never use ANY type of cleaning fluid to clean the solenoid valve plunger assembly or seals.

Cleaning

1. Shutoff all electrical current and pressure.
2. Remove the nut at the top of the solenoid valve.
3. Remove the name plate, coil and housing from the body.
4. If the valve does not leak from the seat and the plunger does not stick in the energized position, the problem is electrical and further cleaning is not required.
5. If the valve leaks from the seat or the plunger does stick in the energized position, proceed to the next step.
6. Use the supplied Peter Paul wrench to remove the sleeve assembly.
7. Examine the soft inserts in the plunger and carefully clean.
8. Examine the inside of the sleeve assembly and carefully clean.
9. If the inserts show excessive wear, replace the plunger.
10. If the valve emitted a loud buzzing noise during operation, examine both the inside of the sleeve and upper portion of the plunger and remove all foreign matter.
11. After cleaning or replacing parts, verify that both the flange seal and the return spring are in place.
12. Loosely screw the sleeve assembly into the body.
13. If the valve has a sleeve port, cap the port and apply pressure to the port leading to the body chamber.



14. If the media is air or gas, apply water to the joint and watch for air bubbles.
15. Reattach the name plate, coil, and housing to the body.
16. Carefully tighten the nut at the top of the solenoid valve. Excessive tightening of the nut can cause unnecessary strain on either the sleeve assembly or the coil under the housing.
17. Restart the electrical current and pressure.

6.6.3 Cleaning/Replacing the 'Y' Strainer

Cleaning/Replacement

Cleaning the 'Y' strainer requires opening the 'Y' strainer housing. This procedure should be done at the end of the work shift when the reservoir's water level will be at its lowest.

1. Turn off the ball valve.
2. Unscrew the bottom of the 'Y' strainer.
3. Remove the screen from inside the 'Y' strainer housing and examine.
4. Remove any debris inside the 'Y' strainer and rinse the cylindrical screen.
5. If the strainer is damaged, replace it.
6. Slip the screen back into position.
7. Reassemble the 'Y' strainer housing.

6.6.4 Water Pump Pressure Check

1. Turn off the auxiliary engine.
2. Use a gauge to check the pump's output pressure. Attach a pressure gauge (able to measure at least 500 PSI) to the boiler drain on the front of the fill hose storage rack.
3. Open the boiler drain.
4. Turn the water pump on.
5. Be sure all the console control panel switches operating the sweeper's water functions are in the off position.
6. If the gauge reads roughly 50 PSI, no adjustment is needed.
7. If the pressure gauge reading is considerably different from 50 PSI, you may need to adjust the water pump's relief valve. Pressure that is jet too high can cause premature water pump failure.
8. Locate the relief valve in the group of fittings attached to the pressure port of the pump.
9. Screw the jam nut away from the relief valve's body.
10. Turn the hexed stem of the relief valve to adjust the water system pressure.

11. When the water pressure is roughly 50 PSI, run the jam nut back against the body of the relief valve.

6.6.5 Water Nozzle Cleaning/Replacement

Due to dusty conditions encountered during sweeping operations, dirt and debris particles entering the dust suppression system are sometimes small enough to pass through the 'Y' strainer. These particles can build up within a nozzle's openings, restricting water flow. When this occurs, the nozzle must be cleaned or replaced.

Cleaning/Replacement:

1. Unscrew the nozzle retainer cap.
2. Remove the spray tip and strainer.
3. Wash the strainer and examine it.
4. If washing the strainer has removed all particles or debris, set aside the (now clean) strainer.
5. If the strainer can no longer be thoroughly cleaned, it needs to be replaced.
6. Wash the spray tip and examine it.
7. If the spray-tip opening is clogged, insert a small-gauge wire into the spray-tip opening to clear any debris lodged inside.
8. If the spray tip is damaged, it needs to be replaced.
9. Reassemble the nozzle, replacing any damaged parts as necessary.
10. Unscrew the bottom of the 'Y' strainer housing to drain the water reservoir(s).
11. After the water flow stops, reassemble the 'Y' strainer housing.

6.6.6 Dust Suppression System Winterizing

Winterizing your sweeper will help keep it in top operating condition, extending its length of service.

If your sweeper's dust suppression system will be operated during freezing temperatures, follow the system winterization section.

If your sweeper's dust suppression system will not be operated when freezing temperatures are expected, drain the system.

System Winterization:

1. Following the antifreeze manufacturer's instructions, add environmentally safe antifreeze to the water by pouring it through the air-gap opening in the top of the reservoir.
2. Start the auxiliary engine.
3. Turn on the Water pump drive motor

4. Turn on all cab console control panel switches controlling water manifold solenoids.
5. Leave switches on until the antifreeze/water mixture flows from the spray nozzles.
6. Turn off all cab console control panel switches controlling water manifold solenoids.
7. Turn the auxiliary engine off.

System Draining:

1. Unscrew the bottom of the 'Y' strainer housing to drain the water reservoir(s).
2. After the water flow stops, reassemble the 'Y' strainer housing.
3. Turn on all cab console control panel switches controlling water manifold solenoids.
4. Connect high-pressure air to the air valve stem located near the water pump.
5. When lines have emptied, turn off all console control panel switches controlling water manifold solenoids.
6. Open the cock drain on the bottom of the water manifold.

6.7 Electrical System

6.7.1 Fuse Panel Layout

FUSE PANEL #1

	R1	F1	25 AMP LGB GEO
LGB GEO EXT		F2	10 AMP CPU1 VBBS
	R2	F3	25 AMP 12 OPTION
LGB GEO RET		F4	25 AMP CPU1 VBBR
	R3	F5	25 AMP RGB GEO
RGB GEO EXT		F6	20 AMP CPU1 VBBO
	R4	F7	25 AMP CNSL PWR
RGB GEO RET		F8	20 AMP CPU2 VBBS
	R5	F9	30 AMP HOP SHKR
OPEN		F10	20 AMP CPU2 VBBR

FUSE PANEL #2

	R1	F1	30 AMP WTR PMP 1
OPEN		F2	20 AMP CPU2 VBBO
	R2	F3	30 AMP WTR PMP 2
OPEN		F4	25 AMP ALT FLASH
	R3	F5	25 AMP LF BLDR
LF BLDR OP		F6	25 AMP OPT 2
	R4	F7	25 AMP OPT 1 & 3
LF BLDR CS		F8	10 AMP BEACON
	R5	F9	25 AMP BOOM PWR
OPEN		F10	10 AMP SNSR PWR

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